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AND OF

THE INSTITUTIONS IN UNION.

111TH SESSION.] FRIDAY, DECEMBER 16, 1864. [No. 630. VOL. XIII.

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Announcements by the Council.

ORDINARY MEETINGS.

Wednesday Evenings at 8 o'clock.

DEC. 21.—The Articles sent in Competition for the Art-Workmanship Prizes will be Exhibited; and a short Review of the Society's past and present action in the Promotion of Industrial Education, by S. T. DAVENPORT, Esq., will be read.

CANTOR LECTURES.

"ON THE REPRODUCTION OF NATURAL FORMS BY ART AND MANUFACTURE." By B. WATERHOUSE HAWKINS, ESQ., F.G.S., F.L.S.

DEC. 19.—LECTURE II.—Demonstrations of the unity of plan in the external forms of animals, the just appreciation of which facilitates the work of the artistic producer, and adds to the enjoyment of the intelligent possessor of works of art.

JAN. 16TH, 1865.—LECTURE III.—On the varieties of artistic treatment of the forms of animal and vegetable life—pictorial representation; conventional ornamental, allegorical, and symbolic combinations of animal forms.

JAN. 23RD.—LECTURE IV.—On the fitness of designs, and their adaptation to the conditions of the materials in which they are to be produced. (Demonstrated by metal-work processes, sand-moulding, casting, and chasing).

JAN. 30TH.—LECTURE V.—On Ceramic Manufactures, with the Influence of the material on the design and its successful production—modern Terra-Cotta, Della Robbia ware, Majolica, and Parian.

These Lectures are open to Members free of charge, and a Member has the privilege of introducing ONE Friend to each Lecture. A set of tickets for this purpose has been sent to every member.

Proceedings of the Society.

CANTOR LECTURES.

"ON THE PRODUCTION OF NATURAL FORMS BY ART AND MANUFACTURE." BY B. WATERHOUSE HAWKINS, ESQ., F.G.S., F.L.S.

FIRST LECTURE.—MONDAY, DEC. 12.—INTRODUCTORY.

MR. WATERHOUSE HAWKINS delivered the inaugural lecture of his course in connection with the Cantor Series of the present session. The subject to which he especialy desired to direct attention was the application of natural forms to Art and Manufactures. In his introductory remarks he referred to the greatly advanced appreciation of Art by the English people since 1851, and pointed out the educational advantages which had resulted from the Great Exhibition, by the establishment of a National Museum of Art Industry at South Kensington, a collection in connection with which the Government Schools of Design were established, and which, in its intrinsic merit and arrangement, was unequalled by any other similar museum in Europe. Notwithstanding the improved appreciation of Art by the public, and the advantages which existing Art collections afforded to the student and workman, he nevertheless deplored the inability of the English artist to produce designs suited to the requirements of the British manufacturer, equal to those produced by the foreign designer and artist—this was particularly evidenced by the fact that in the Exhibition of 1862, nearly every important work exhibited by our great Art-Workmanship manufacturers had been produced from the design of some foreign artist. He then proceeded to discuss the reason of this deficiency of the English artist, and stated that he considered it resulted from the nature of the training to which Art-students were subjected in England, as compared with the system pursued in continental countries. In England the Art instruction tended to create skillful copyists, great precision, and steadiness of hand in the use of the pencil, but at the same time crippled the mind, whereas on the Continent the student was taught to take broad views of

Art by observing the structural forms of objects in nature, a system which left the mind and hand much more free. He believed that the Englishman's impediment was not a want of material in which to produce, nor yet examples to study, but resulted from a heavy drill, which created good imitators, but did not tend to create inventors. In order to invent or create successfully good designs for the Art manufacturer, it was necessary that the artist should possess a thorough knowledge and appreciation of the structure of natural objects, without which knowledge it was impossible for the draftsman to adapt the frames of men or animals to the requirements of the ornamentist and the processes of production, and ornament, if produced without a knowledge of structure, inevitably resulted in imperfect drawing or unnatural distortions. He then proceeded to point out that one universal law of structure pervaded the whole of the animal kingdom, a knowledge of which enabled the designer to correctly represent and apply the conception of his mind to the ornamentation of matter; and, by means of diagrams which he drew upon the black board, showed that man in an erect position could readily be made to represent a lion, as commonly drawn in Heraldry, stating at the same time that, structurally, the two were identical. He then referred to the importance of natural history museums in an Art point of view, and called attention to the method employed by Mr. Waterton of preserving skins of birds, animals, and reptiles, by the use of corrosive sublimate dissolved in spirits of wine, and urged the importance of natural forms being preserved truthfully in an artificial state, as otherwise the specimens tended to mislead the student rather than to instruct him in the flowing lines and graceful forms so commonly to be found in the animal kingdom.

FIFTH ORDINARY MEETING.

Wednesday, December 14th, 1864; Lord Dufferin, K.C.B., in the chair.

The following candidates were proposed for election as members of the Society:—

Bayley, John C., 1, Park-place-villas, Maida-hill, W.
Buxton, William, Lime-tree Lodge, Rotherhithe, S.E.
Hancock, Henry J. B., Duke's-hill, Bagshot.
Knight, John Peake, South Eastern Railway, London-bridge, S.E.
Lowe, John Stanley, 31, Cornmarket-street, Oxford.
Melliss, George Whalley, 17, Talbot-terrace, Westbourne-park, W.
Parnell, Hugh, M.A., 3, New-square, Lincoln's-inn, W.C.
Strachan, Charles Henry, 51, King's-road, Camden-town, N.W.
Vincent, Henry, 28, Mornington-crescent, N.W.

The following candidates were balloted for and duly elected members of the Society:—

Barnes, Joseph, 5, St. Thomas'-street, Borough, S.E.
Batson, John, 42, Brewer-street, Golden-square, W.
Dear, Alfred, Pavilion, Belgravia, S.W.
Dear, Arthur, Pavilion, Belgravia, S.W.
Forristall, Michael, The Hermitage, Forrest-hill, S.E.
Grundy, John, The Middle Temple, E.C.
Hall, J., 29, Warwick-square, S.W.
Huth, Edward, Oakfield Lodge, Huddersfield.
Lane, William James, 5, Studley-villas, Studley-road, Clapham, S.
Lord, James, St. John's Lodge, Wandsworth-common, S.W.
Monteith, James, 38, Duke-street, St. James's, S.W.
Moss, William H., 19, Parliament-street, Hull.
Rochussen, Theodore Anthony, 9, Friday-street, E.C.
Saunders, Edwin, 13*a*, George-street, Hanover-square, W.
Schweizer, J. J., 28, Poole-street, New North-road, N.
Scott, Rev. C. B., 19, Dean's-yard, Westminster, S.W.
Turner, Henry, St. Joseph's-road, Higher Tranmere, Birkenhead.
Twentyman, William Holme, Manor-hill, St. John's-wood, N.W.
Vaudrey, Henry, 10, Norland-square, Notting-hill, W.
Walker, G. H., Rugby.

The following Institutions have been taken into Union since the last announcement:—

Knutsford, Penny Readings.
Preston, Institution for the Diffusion of Knowledge.

The Paper read was—

ON THE RECENT PROGRESS AND PRESENT STATE OF INDUSTRY IN IRELAND; AND THE DUBLIN INTERNATIONAL EXHIBITION OF 1865.

BY SIR ROBERT KANE, F.R.S., PRESIDENT OF QUEEN'S COLLEGE, CORK, AND DIRECTOR OF THE MUSEUM OF IRISH INDUSTRY, DUBLIN.

At the request of the Executive Committee of the Industrial Exhibition, which is to be held in Dublin in the summer of next year, I have undertaken to bring under your notice this evening some explanation of the circumstances under which that Exhibition has been undertaken, and the arrangements which have been made to secure its success, together with such notice of the present position of Ireland, in an industrial point of view, as may enable the members and visitors of this Society, representing as they do so fully the industrial intelligence and commercial energy of this country, to judge whether the objects for which we in Ireland are now labouring are worthy of that sympathy and co-operation which I trust we shall be able to obtain. Almost simultaneously with the earliest efforts of this Society, to realise, by means of exhibitions, the actual position of British industry, similar exertions were made by those in Ireland, who were anxious to direct the energies of that country to the permanent and solid advantages of industrial pursuits; and amongst the means employed for that useful purpose, exhibitions of manufactures held a prominent place, these, although necessarily of a local and limited character, obtained a large amount of popularity and success. All such exhibitions, however, whether held here or in Dublin, could be considered but as the faint glimmerings of dawn heralding the full refulgence of the day when under the august Prince, whose loss the friends of intellectual and industrial progress will always deplore, the Exhibition of 1851 was inaugurated, and that unparalleled review of the aggregated productive forces of the world was opened to the assembled nations. The impetus thus given led to a greater development being allowed to the Exhibitions which took place in Ireland immediately after, as in Cork in 1852, and especially in Dublin in 1853. The objects were no longer limited to Irish manufactures, as they had previously been, but the British and foreign manufacturers were invited, to render the Exhibition in Dublin, as in London, really international. The Dublin Exhibition of 1853, for which a building admirable in its adaptation had been provided by the liberal enterprise of Mr. Dargan, was remarkable for the introduction of Fine Arts as a leading department, and was honoured by the presence and approval of Her Majesty the Queen and her illustrious Consort.

The great International Exhibition of 1862, which, after the interval of eleven years, had renewed with still greater richness and completeness of illustration the glories of 1851, had naturally suggested that after a similar interval an International Exhibition should be held in Dublin. It may be stated that an Exhibition has this year been held at Dublin and attained considerable popularity. Being limited, with the exception of machinery, to the display of objects of Irish manufacture, this Exhibition was on too small a scale to represent in any

degree the progress which foreign and domestic industry has made within the last ten years.

The opportunity of which it is now proposed to make use, in order to organize in Dublin an International Exhibition, which shall be the worthy successor of the great successes of 1851, of 1853, and of 1862, has arisen from the fact that a number of gentlemen, of whom it is only necessary to mention the names of the Duke of Leinster, of Mr. Guinness, and of Mr. Dargan, possessing at once the inclination and the power, have undertaken to provide for the citizens of Dublin a great winter garden and buildings containing concert and lecture rooms, supplying, but on a smaller scale, the resources and enjoyments of the Crystal Palace at Sydenham. An independent Executive Committee having been formed to organise and carry out an International Exhibition, the Directors of the Winter Garden have most liberally placed their fine buildings altogether at the disposal of the Committee for that purpose, and the Executive Committee have gladly availed themselves of this truly patriotic proposal. The Exhibition will, therefore, be organised under extremely favourable conditions, as all that in other previous occasions had entailed the greatest amount of expense, of responsibility, and of risk, will have been spontaneously and all but gratuitously provided, whilst the authority and direction is preserved entirely in the hands of the Executive Committee. The great advantage which will thus naturally result to exhibitors in the arrangement of their articles will be easily understood, and it has been arranged that all funds arising from the receipts above the payments of the expenses incidental to the Exhibition, shall be vested in a Committee of noblemen and gentlemen, under whose direction the excess shall be applied to public purposes for the advancement of Arts and Sciences in Ireland.

Such being the circumstances under which the proposed Exhibition is to take place, I shall very briefly notice the position which the building occupies. It is situated on the south side of Dublin, and in what may be considered the most fashionable quarter of the city; close to the terminus of the railway which leads to the beautiful mountain scenery of Wicklow. The extent of space accommodation available may be found in detail by reference to plans which are in the office of this Society, but I need only say that the accommodation already at their disposal is very large, and there are, as I believe, now present, gentlemen representing the Committee of Advice and the Executive Committee who will be able, and I am sure willing, to supply information as to the details of space, much more precisely than I could attempt to do. The principal portions of the Exhibition will be located in the Great Conservatories of the Winter Garden,—constructions in glass and iron, rivalling the Crystal Palace itself in elegance of design, although of course much inferior in extent, and affording advantages as to supply of light and means of display which could not be surpassed.

Under those favourable circumstances it may be hoped that, not merely on public grounds, but even on the lower but more directly practical basis of individual advantage, we may hope for the co-operation of the manufacturers of Great Britain, who cannot fail to derive material benefit from bringing the products of their factories and workshops under the immediate cognizance of the Irish people. The Executive Committee have good grounds for expectation that the industrial resources and products of our Colonies and of the European Continental States, with scarcely an exception, will be adequately represented on that occasion. Gentlemen of great activity and intelligence have visited, on the part of the Executive Committee, the governmental authorities and the industrial centres of the Continental States; they have been uniformly received in a most friendly spirit, and have received promises of active co-operation. We shall thus have brought before the inhabitants of Ireland the most beautiful and perfect productions of the industrial enterprize and artistic genius of Italy, of France, of Germany, and of Belgium. We shall have, as I expect, very efficient evidences of what Ireland itself can do in the way of manufactures; and it is to be hoped that the British manufacturers, even satiated as they may well be with triumphs already gained, and somewhat fatigued from the exertions by which that success was earned, will still not allow an International Industrial Exhibition to take place without Great Britain being properly represented, the more when that Exhibition will be held under the august sanction of Her Majesty the Queen, who has most graciously been pleased to become its patron, and when the Executive Committee have reason to expect that the Exhibition will be honoured by the presence of their Royal Highnesses the Prince and Princess of Wales.

Among the elements of success to which the Executive Committee attach the greatest value, must be considered the support and co-operation which has been received from the Council and officers of this Society. By their assistance a London Committee of Advice has been formed, which has contributed materially to our success. The all-pervading and well-earned influence of the Society of Arts throughout the manufacturing world secures to its recommendation, or as I may say, to its endorsement, an attention that no other body could command; whilst the accumulated experience of its officers in everything connected with the organisation and management of Industrial Exhibitions has even already proved of the utmost value. The Members of the Executive Committee are therefore anxious that I should express how deeply they feel the benefits of the advice and assistance they have received from this Society.

Whilst making the arrangements which I have endeavoured to describe for procuring a full and satisfactory representation of the natural resources and industrial progress of our colonies and of foreign states, the Executive Committee has had its attention naturally directed to the position which the productions of their own country should occupy in the Exhibition. Two courses were open to them—the one, of carrying out the principle of geographical classification, which will be adopted as regards the colonies and foreign countries, and thus to arrange the manufactures of Great Britain and of Ireland separately; or on the other hand, to merge all separate insular existence, and exhibit under one head the industrial productions of the United Kingdom. Although the former plan might have tended to conciliate to the undertaking a good deal of local feelings and honest prejudices, the Executive Committee have decided upon adopting the other course, and propose to arrange that all natural and manufactured products of Ireland shall fall into their respective positions as elements of the great total of British industry, extending to the results of industry—that fusion of interests and of objects which has already made so much progress in the political and social relations of those two countries.

In taking this course, however, the Committee are quite sensible of the risk that the industrial productions of Ireland—which are so limited in amount and in variety, as compared with those of Great Britain—might easily be lost sight of, and pass unnoticed in the immensity of the results displayed by her more fortunate Sister; and that, although acting upon the purest motives, and taking a course which I am sure will be found to be correct, they might be the innocent means of an injustice being done to the manufacturers of their native land. This it is desirable to prevent, and hence I feel it my duty in this paper, which may be considered as in some degree a foreshadowing of the Exhibition which is to come, to supply a notice of the present condition of manufacturing industry in Ireland, not attempting to go into details, or to mention every department, but only such as may furnish an idea of what is being done, and what we may hope to be able to do in the way of successful manufactures.

Every person is familiar with the fact that—whilst in this country the great development of manufactures forms the characteristic of its social organisation and the foundation of its political strength—in Ireland the manufacturing industry has not attained any similar extension, and that agriculture, generally speaking of an imperfect kind, forms the principal means of occupation and of existence to the people. Hence the terrible results which followed from the potato disease, and consequent famine in the years 1845–46, by which not less than a million and a half of population was destroyed, and which, followed by a continuous stream of emigration, numbering not less than 80,000 a year, reduced the population of Ireland from 8,175,124, in 1841, to 5,798,967, in 1861. I do not feel called upon, or indeed here even authorised, to express an opinion as to how far this great diminution of population is to be regarded as a national misfortune or the reverse; it is impossible, however, not to recognise that, under at least two points of view, society has benefited by the changes thereby introduced: Firstly, the establishment of the Incumbered Estates Court, by which the position of landed property has been simplified, and the introduction of an improved system of agriculture facilitated. Secondly, the rate of wages has been very materially increased, and payments in money generally substituted for a complex system of allowances, which practically left to the agricultural labourer little beyond the mere permission to live.

A population thus specially devoted to agriculture in its simplest form can turn only with difficulty, and under great stimulus, to manufacturing operations, so much more complex in their nature, and requiring so much more of intellectual exertion for their successful prosecution. In fact, even in England the first introduction of the staple manufactures had been mainly due to the successive waves of foreign population, Flemings, Germans, and French, who, retiring from the political and religious persecutions to which they were exposed in their respective countries, sought the safety and refuge which England alone, then even as now, presents to all that peaceably land upon her shores. To the philologist a curious study is afforded in the technical expressions still employed in the every-day language of the English workman in various manufactures, marking the foreign origin of those trades, and even the time and circumstance of their importation.

Similarly in Ireland we were indebted principally to strangers for the introduction of those branches of manufacture which were subsequently carried on with most success; and in many cases the names most eminent, even at the present day, among our mercantile community, mark unmistakeably the historical events which had deprived their native countries of the ancestors of such worthy sons.

The absence from Ireland of any abundant deposits of bituminous coal, such as occur in this island, and on which gift of nature has been built up the colossal fabric of England's industrial power, necessarily prevents the establishment in that country of those branches of trade in which the cost of fuel forms any very large proportion of the total cost of production. Hence, although possessing in abundance deposits of the richest iron ores, we have not had any successful establishment of iron smelting in recent times. The iron ores, however, both as earthy carbonate and as hematite, are now largely exported from Ireland to this country to supply the enormously-increased demand. Similarly, although large quantities of copper ore are raised in Ireland, principally in the southern counties of Cork and Waterford, the ore is shipped to Swansea to be smelted, as the large proportion of fuel which is required in smelting copper would render the progress in Ireland too costly to be profitably carried on.

In the case of the ores of lead and silver, however, the proportion of fuel necessary is not so large, and not merely are all the lead and silver ores raised in Ireland smelted in the vicinity of Dublin, but a large quantity of foreign ores of those metals are imported for Irish smelting works, the produce from which is highly esteemed, not merely in the local but in the British markets. I believe that this department of mineral industry will be found very efficiently represented by Irish smelters in the coming Exhibition.

Although the smelting of iron ores and the actual manufacture of iron is not now carried on in Ireland, yet there is a very large amount of trade in the making of machinery, especially for the linen manufacture, of steam engines and water-wheels, and of late years of iron ships. This latter business has already assumed large proportions. The Messrs. Harland and Wolff, of Belfast, have built in the last ten years twenty vessels, of an aggregate tonnage of 36,913 tons, giving employment to about 1,200 men. The establishment of Messrs. Malcolmson, at Waterford, is similarly active, and employs about 300 men, turning out annually, at least, one first-class steamer, mostly above 2,500 tons burden each, and engaged in transatlantic voyages. The establishment of Mr. Pike, in Cork, is equally successful; whilst that of Messrs. Walpole, Webb, and Bewley, of Dublin, although only two years in existence, already gives employment to about 600 hands, and has completed five vessels, of which one of 1,434 tons burden, the *Knight Commander*, was almost the only ship that rode out uninjured the terrific cyclone that recently caused such frightful calamity at Calcutta. I mention these particulars to illustrate how much of industrial activity there already exists in Ireland, and how marked the extension of that activity in certain departments has latterly become.

A very large branch of mining industry in Ireland, that of iron pyrites or sulphur ore, becomes the basis of an extensive series of chemical manufactures, which, however, are limited, just as in the case of iron smelting, to those branches in which the cost of fuel does not form a preponderant proportion of the total cost of manufacture. In Dublin, Cork, and Belfast, large quantities of sulphuric acid, of chloride of lime, sulphate of soda, magnesia, &c., are made; the important branch of alcali making, as caustic and carbonate of soda, however, is not, as I believe, carried in Ireland beyond the manufactures of sulphate of soda.

In mentioning the absence in Ireland of deposits of bituminous coal of industrial importance, it is, perhaps, proper to mention that several extensive coal fields, yielding, however, principally anthracite coal, exist in the interior of that country, and are worked with success and profit. Their produce is, however, not so well fitted for manufacturing purposes, and is all employed for domestic purposes in their localities.

I cannot pass from the subject of Irish fuel without reference to what constitutes so important a feature in the scenery and the agriculture of Ireland, the Irish peat-bogs. The reclamation of those great tracts of land to the uses of agriculture, and the employment of those stores of peat to the purposes of fuel, have occupied, and very properly, a very large amount of attention; but, whilst recognising fully the importance of the subject, it will be seen that the progress of society and of the industrial arts in later years has divested the question of much of the paramount importance that formerly belonged to it. In regard to the restoration of the peat-bogs to agricultural purposes, the first and necessary element must be a perfect drainage, a measure of truly national importance, indispensable for the proper cultivation of even the best land, and, in considering which, the improvement of mere peat mosses cannot be held the primary object. But now that by the researches of Liebig, of Lawes, and others, the true principles of the growth of agricultural crops are understood; it is well known that even thoroughly drained peat will not supply the materials required for the production of food, and that the cost of supplying those materials, in the form of manures, if applied to the same area of land of more suitable constitution, will yield greater and more profitable returns. Hence, where ordinary farm land can be obtained,

its improvement is preferable, as a field for the employment of labour and of capital, to the reclamation of peat bogs.

Similarly, the altered circumstances of the country have deprived the question regarding peat as a fuel of much of the importance that formerly was attached to it. The facilities for internal intercourse afforded by the railway system which Ireland already possesses, and which tends every year to expand, together with the low rates of freight, which allows the introduction of sea-borne coal at moderate prices, all tend to limit the area within which peat as a fuel can be advantageously employed, and to confine its use to the vicinity of the bogs and to the agricultural population. The heating power of peat being, even when best prepared and driest, not more than two-thirds of that of coal, together with the greater cost of transport of a bulkier and less valuable article, place a limit to its economy which will determine practically the area within which it can be employed. The various plans proposed from time to time for the preparation of compressed peat have, therefore, been found not to possess the pecuniary advantages which had been at first expected from them, although eminently successful in so far as producing a compact, convenient, and agreeable fuel, which, in some respects, may deserve a preference over coal, although it cannot do so for general manufacturing purposes.

The soil and climate of Ireland has always been favourable to the growth of wool, especially of the longer stapled kind, and at an early period the quantities of Irish wool exported to England were considered to interfere so much with the interest of English wool growers as to lead to some harsh fiscal regulations. Owing to various circumstances of the country and of the times, the woollen trade of Ireland had declined very much indeed, until within the last few years, when it began to revive, and it is now every year rapidly expanding in extent of business and in the variety of articles made. Thus in Dublin, in Cork, in Waterford, and in various inland towns, woollen and worsted mills that had been abandoned have resumed work, mills already in action have augmented their number of looms and spindles, and new mills are being erected. This great improvement is partly due to the fact that the diminished supply of cotton has produced a general increase of activity in the woollen trade, and also to the excellent character which Irish-made woollen goods have acquired in the English markets, being practically free from those sophistications that are but too commonly in use. The actual expansion of this branch of industry within ten years is shown by the fact that the number of woollen and worsted mills in Ireland had increased from nine in 1851 to forty-three in 1863; being nearly 463 per cent.

The cotton manufacture exists in Ireland, but to a limited extent, and latterly, since the diminution of the supply of cotton, many mills have been altered from cotton to flax spinning and weaving, in order to meet the increased demand for linen goods. This has been the case to a great extent with the factories of Messrs. Pim, at Dublin, and of Messrs. Malcolmson, near Waterford. The latter, belonging to the same enterprising family which I have mentioned already in reference to the building of iron ships, is one of the most completely organised manufacturing establishments with which I am acquainted. It contains 31,000 spindles and 950 power-looms, with all the necessary machinery required for the spinning and weaving department. Being to a great extent isolated from other works they are obliged to depend on themselves, in many cases, for the construction and repairs of machinery, and hence there is attached to the mill a foundry and mechanics' shop, where machinery equal to any made in the best English workshops is constructed. The total number of hands employed by the Messrs. Malcolmson, in their various works, may be taken as averaging about 3,000.

The mixed woollen and silken tissues, which are known as poplins, or tabinets, have been considered as peculiarly an Irish fabric, but the manufacture was first introduced into that country at the beginning of the eighteenth century, by some Huguenot refugees. This branch of trade had of late years considerably declined, until the recent commercial treaty with France, which opened up the markets of that great country, where the rich tissues of the Irish looms were extremely popular. Since that time the poplin trade has been very active, every competent hand being fully employed until within the last three months, when a reaction appears to have occurred, which has somewhat diminished the demand. This interesting branch of trade gives employment, principally in Dublin, to more than 1,200 persons, of whom about one-fourth are employed by the Messrs Pim, a firm active in all that tends to promote intellectual cultivation and industrial habits, giving, in their various departments of business, occupation to over 1,000 hands, and providing not merely for the material wants of those in their employment, but practically evincing most praiseworthy interest in their moral and social life. By the example of such employers, labour is truly dignified, and leaders of industry vindicate their right to the high position which, in this country, has been so justly conceded to them.

Of all branches of industry, however, that which is of most importance to Ireland, from the amount of capital it represents, and the number of persons to whom it gives occupation, is the linen trade. I am indebted to the kindness of Mr. M'Ilwrath, secretary to the linen trade of Belfast, for much valuable information on that subject, and also to Mr. M'Call, of Lisburn, for many interesting particulars, of which I shall endeavour to lay before the Society such general heads as our limited time may allow.

The linen trade of which Belfast has been long the established head-quarters in Ireland had been rather falling off in amount, until the interruption of the supply of cotton by the American War called it into immensely increased activity. The contrast in this regard is well shown by the following figures:—In 1859 there were in Ireland 82 flax-spinning mills, containing 651,872 spindles, of which 91,230 were unemployed; whilst in 1864 there were 74 spinning mills with 650,744 spindles, of which but 8,860 were unemployed, whilst 50,638 additional spindles were in May last about being set to work. Further, in addition to the above there were employed in 1864, 14,648 spindles occupied in making thread, and five mills were in course of erection to contain 45,000 spindles. In regard to power-loom factories for linen, a similar remarkable increase is shown for the same period. Thus, in 1859, there were 28 factories with 3,633 looms, of which 509 were unemployed, whilst in 1864 there are 42 factories with 8,187 looms, of which but 258 are unemployed; 1,685 additional looms were about being set to work at the date of the return in May last. The introduction of the factory system into the linen trade, and especially the power-loom, is comparatively modern, the first spinning mills for flax in Ireland having been established about 1828, previously to which time cotton spinning was much more extensively carried on in Belfast than it has since been.

The great extension of trade and the benefit to the operative classes which followed this change, may be illustrated by the following fact:—When spinning and weaving were done by hand, the firm of Richardsons, of Lisburn, turned out from 15,000 to 20,00 pieces of goods in twelve months; that firm can now deliver 250,000 pieces of bleached goods in the same time.

As to wages, in the old days of spinning on the domestic wheel, the earnings were from 2s. 6d. to 4s. weekly, whilst at present in spinning mills the ordinary work-women make from 3s. 6d. to 6s. per week, and superior hands from 6s. to 8s. The best hand loom weaver can only make 6s. per week, out of which he has to pay charges which leave him only 5s., whereas an ex-

pert girl, who can attend to two power looms, can make 10s. per week clear. Thus the earnings of individuals have been materially increased by the introduction of steam machinery in the linen trade; and in regard to the total amount of employment, there were ten years ago, 17,000 persons employed in this trade in and about Belfast, whereas in the present year the number employed in the mills is 25,000, exclusive of the vast number of outsiders who indirectly derive their subsistance from that branch of manufacture.

Coupled with this developement of the linen trade there has taken place a great increase in the quantity of flax cultivation in Ireland. During the Crimean War, when the Baltic trade was subjected to certain impediments, the quantity of land under flax was increased and amounted in 1853 to 174,579 acres, but on the restoration of peace, the Baltic trade being resumed, the demand for home-grown flax diminished, and the cultivation fell off to 91,646 acres in 1858. Since that time it has again progressively increased, and has now assumed proportions entirely unprecedented, the quantity in 1863 having been 214,099 acres, and in the present year having increased to 301,942 acres, which at an average of 35 stones of clean scutched flax to the acre, gives the produce of fibre at 10,567,970 stones, or 66,050 tons; and at an average price of 7s. 6d. per stone, the total value of the crop of the present year, is £3,962,989. This great increase of production is accompanied of course with corresponding increase of the export trade. The total value of linens exported from the United Kingdom has nearly doubled within the last three years, having been in 1863 £8,469,036, against, £5,193,347 in 1861.

A corresponding increase has taken place in the branches of steam engine and machine making connected with the linen trade. The foundries and workshops occupied in that way have fairly doubled in extent of business and number of hands employed, while wages have increased within the last two years from 10 to 15 per cent. Simultaneously, the general trade of Belfast has increased to such a degree, that in the year 1863 the imports amounted to £8,505,991, and the exports to £10,472,598. The tonnage of the port in 1861 was 920,800 tons, and the revenue £40,600, whilst in 1800 the tonnage of Belfast had been but 54,200 tons, and the revenue collected but £2,740.

Closely connected with the linen and cotton manufactures are the important industries to which the refuse and worn-out remains of textile fabrics are devoted, the manufacture of paper and pasteboard. This branch of trade is extensively carried on in Ireland, especially in the neighbourhood of Dublin. The quantity of paper manufactured annually at the time the duty was repealed, was between 9 and 10 million pounds. The advantage afforded to the introduction of foreign-made paper by the late commercial tariff has depressed the condition of the paper trade in Ireland as it has done in this country, but it may be hoped that the relaxation of the export duty on rags, which has lately been made in the Treaty of Commerce between France and Switzerland, will mitigate, after some time, the disadvantage under which the British maker is now placed. In regard to specially Irish interests, I may mention that the lower price of straw in Ireland has led to a very extensive manufacture of the low-class paper containing that material, and that a large proportion of the cheap literature of London is printed on Irish manufactured paper.

A very large source of employment is afforded throughout Ireland, especially in the northern districts, in the sewed muslin trade, which occupies, it is estimated, over 300,000 females. The products of this industry are generally sent into commerce as Scotch, the greater number of the firms giving out the work being of that country. Indeed, this class of occupations are curiously cosmopolite, and illustrate the tendency of industry to overcome the distinctions of country and of race. Thus in the trade of shirt making, by which considerable employment is given in Ireland, I have been informed that for some large houses the shirts are cut out and sewn in Ireland, are then sent to Scotland to be washed, thence they pass on to London to be made up and prepared for sale. Most of the shirts, however, manufactured in that way are intended for exportation.

Minor industries of that class are, I am happy to say, being introduced and extending themselves in Ireland. Thus the making of ladies' corsets and crinolines was commenced in Dublin by the enterprise of Mr. Crotty, some few years back, and his firm now employ 700 girls, who earn from 5s. 6d. to 10s. per week, producing at the rate of about £60,000 worth of corsets per year, all of which, as I believe, are exported to this country. For it is a remarkable, and I believe a healthy characteristic of Irish manufactures, as they are now carried on, that they do not depend for their success on any excitement of misdirected though honest patriotism or protection. In fact, the prejudice is entirely the other way, and the Irish manufacturer meets much more ready customers abroad than he can find at home. This, however, is not peculiar to Ireland. Similar feelings are met with in every country; and it is most creditable to the manufacturers in Ireland, that in every branch their products find a welcome reception both in Great Britain and in foreign countries, grounded on the confidence which has been established in the honesty of the materials, and the excellence of their make.

It would be unsuitable, if, in speaking of Irish manufactures, I omitted noticing what had been long considered the staple manufactures of that country—porter and whisky. Of the latter, the production and consumption has of late years very much declined, the quantity of Irish made spirits entered for consumption having fallen off from 8,136,362 gallons in 1853 to 3,898,268 gallons in 1863. This enormous decrease is due partly to the increase of duty, but I believe in a greater degree to the improved habits of the people. A large increase in the production of ale and porter is shown by the returns of malt on which duty was paid, which rose from 1,576,148 bushels in 1855 to 2,234,947 bushels in 1863. This increase, however, is in great part represented by the development which the export trade in porter has received.

Those remarks will serve to illustrate in some degree the position which the Irish manufactures may be expected to take in the approaching Exhibition, and although, with the exception of the linen trade, not comparable in extent with the same branches of industry as carried on here, yet it will, I believe, be found that what is done is done well, and will establish their right to an honourable companionship with their fellow-labourers in Great Britain.

I am indebted to my friend Mr. Barrington, who, I hope, will have the honour, as Lord Mayor of Dublin in the coming year, to receive in a manner worthy of the city and of the great manufacturing firm which he so efficiently represents, some details as to the position of the soap and candle trade which is carried on to a considerable extent in Ireland, especially in Dublin; about 230 tons of hard soap and about 40,000 dozen pounds of candles being made weekly. This manufacture, which has been said to constitute a test for the civilization of a country, is steadily progressing in Ireland.

Under these circumstances, I trust that the manufacturers of Great Britain will not hesitate to lend their assistance towards rendering the Exhibition a sufficient representation of the productive power of our common country. Now that the intervening channel has been practically bridged by the splendid steamers which give to the passage more than the security and almost the comfort of the railway train, the journey from London to Dublin occupies but a portion of a day, we may by our uniting on the common ground of industrial fellowship, contribute to cement that union by which the greatness and the tranquillity of the empire is secured. The position and the prospects of Ireland have been represented

in very desponding colours. Her woes and losses have been eloquently traced to commercial jealousy and political misgovernment, and there has been but too much foundation for that charge. We have, as I hope, however, passed from the crimes and errors of an ignorant and bigoted age into a time when the blessings of education have taught all classes the true road to national prosperity, and when a more enlightened and tolerant spirit governs the relations as well of nations as of individuals. Scarcely beginning to recover from the fearful visitation of the potato famine, Ireland has had to pass during the last five years through a succession of wet seasons and bad harvests, entailing and annual loss estimated by the highest authority, Judge Longfield, at five millions annually, or 25 millions in the 5 years. No wonder then that her agricultural capital has not augmented during that time; that the quantity of live stock has not been multiplied; that the area under cereal crops has not increased. But, with all this, even with the emigration of a class which it would be desirable if possible to keep at home, the amount of crime has been diminished by one half, and of pauperism to six-tenths within the last ten years, whilst wages have risen as well in agricultural as manufacturing districts to a point practically equal to the cost of labour in this country.

Our visitors next year need not imagine that in crossing a narrow channel of the sea they will pass into a wilderness, where agriculture is abandoned and trade extinct, among a population, lawless and pauperized, abject and ignorant, whose only signs of national activity are outbursts of political and sectarian strife, miserably caricaturing that grand struggle which settled the constitution of this country a century and a half ago. Under a surface scum of passion and discontent, which represents the former Ireland, and is every day melting away, the humanising influences of education, and of equal laws, have called forth a new and a better Ireland, a population intelligent and moral, peaceful and provident, able and willing for any work that may be set before them, and seeking such work even in the most distant portions of the globe. Such a people require only fair and considerate guidance and example to constitute themselves admirable materials for industrial enterprise, and prove themselves worthy to participate in the prosperity and power of this great empire. I regard, as highly conducive to that great end, that our British neighbours, especially those who are themselves engaged in industrial pursuits, should know more of Ireland and of its people; that they should learn to judge of the people and of the country as they now are, and not by the newspaper exaggerations, or stories of a by-gone time. Such means of calm and dispassionate judgment will be afforded by the opportunity of the Exhibition next year; and—as I believe the result will be to elevate the position of Ireland and of its people in the opinion of those who are most competent to decide, as well as most interested in the result—I do trust and expect that England and Scotland, as well as more distant foreign countries, will be well represented as visitors and as co-operators in the approaching Exhibition.

DISCUSSION.

Lord POWERSCOURT, in responding to the call of the chairman, would as Chairman of the Fine Art Department of the Exhibition, offer a few remarks. There could be no doubt that the Fine Arts could not flourish in a country which was not materially prosperous. Refinement and art were the children of education, and education in any country was not obtained without a certain degree of affluence. The history of the world showed that the wealthiest and most powerful people had been the foremost in the fine arts. The great emporiums of riches and commerce, such as Manchester, Liverpool, and other manufacturing cities, were the places where at the present time the greatest encouragement was shown to painters and sculptors. Ireland, unfortunately, was not in the position of affluence and superfluity which England enjoyed. The causes of this state of things he need not enter into, but in a backward country like Ireland the difficulties were great, on account of many conflicting and antagonistic interests. It was, however, more than ever the object of any lover of his country to do what he could to promote the civilisation and refinement of his countrymen; and in cultivating a taste for the fine arts, he believed we should aid materially in this direction. Unfortunately his countrymen had not yet sufficient confidence in a rule which sought to place them as free citizens on a noble equality with the rest of civilization by means of education and refinement. He thought if all classes in Ireland gave more encouragement to the arts and sciences, it would tend to raise Ireland to the level of other countries. International Exhibitions were great promoters of intercourse, and friendly intercourse promoted mutual improvement. He was happy to add that the prospects of the Exhibition in that department over which he presided were most encouraging, and he had no doubt that the artistic display in Dublin, in 1865, would be of a very attractive character.

Mr. VESY FITZGERALD said, more than anything else with which he was acquainted, these Industrial Exhibitions demonstrated the fact that individual effort, in the present age, attained the largest results when it availed itself of the power inherent in the principle of co-operation; for these exhibitions depended on the co-operation of class with class, of country with country, and of man with man. They produced fruit, and the production of fruit was what Lord Bacon held forth as the great recommendation of his system of Inductive Philosophy, which had formed the basis of the development of science and of material progress that had been witnessed by the last two centuries. All the education of the popular taste and faculties which was imparted by the study of the Fine Arts, was afforded in the most effective manner by these exhibitions. But they led also to an advance in artistic skill, and to the general improvement of manufacturing processes. The Committees appointed by this Society, in consequence of the last Great Exhibition in London, were calculated to be of great use in this way, and, without doubt, would prove to have been most useful, but it was, of course, difficult to know the exact nature of improved processes adopted by individual producers, until all idea of secrecy connected with them had passed away; so that it could not be immediately ascertained. New articles, and patterns of various goods, however, met one's eyes every day, the idea of which was taken from things seen in those Exhibitions. He would conclude by expressing his conviction that the principle of improvement inherent in these exhibitions was most powerful in its operation, and that the extent to which it might probably be felt was obviously impossible to estimate.

Mr. HERCULES MACDONNELL, in responding to the call of the Chairman said, it was not his intention to enter into any of the many general topics which had been so well discussed in the interesting paper they had heard. He merely wished to add, as supplementary to what they had heard from Sir Robert Kane, a few facts which had come within his own personal knowledge, and tending to show that the exhibition was likely to be eminently an international one. As one of the Executive Committee, it fell to his lot to put himself in communication with foreign governments, and more particularly those of Southern Europe. He begged, in the first instance, to return his thanks to the members of this Society and to the officers of the South Kensington Museum, who had furnished him with information as to the best means of proceeding, and with introductions to those most likely to aid him in his object. They had supplied the much-needed compass without which he would have been unable to steer his course in this, to him, novel undertaking. He in the first instance went to France, and he was happy to say his application was not at once acceded to. The French

Minister showed great willingness to listen to all he had to say, but he required to be satisfied as to the soundness of the undertaking. The result was, that the Government was satisfied on that head, and decided that the enterprise was deserving of their support and co-operation. And here he might say the promoters of this exhibition did not feel themselves in the position of those who undertook a similar duty in 1862—viz., to solicit foreign governments to give pecuniary aid to the undertaking. It was felt by the promoters of the undertaking that all they could ask foreign governments to do was to forward the goods of their exhibitors to the nearest seaports, from whence the managers of the Exhibition would provide for their transport to Ireland, undertaking to send back the objects unsold to those ports, and to pay the insurance. In France he was happy to find that so able and enlightened a government gave its assistance and co-operation to the enterprise, Prince Napoleon, who was not only a prince, but a man of great talent and large experience in exhibitions, took up the matter warmly, and he (Mr. Macdonnell) had reason to think the opening of the exhibition would be honoured by his presence. Backed by the example of so great a nation, he next proceeded to Belgium, where, he was happy to say, he met with ready and almost enthusiastic co-operation, and many of those who acted as commissioners for the Exhibition of 1862 had undertaken the same duty in regard to the forthcoming Exhibition in Dublin. From thence he proceeded to Holland, where he met a very warm response, and that country would be well represented, and no doubt would acquit herself well in this contest of nations. After that he went to Frankfort, which, though not great in itself, was a most important commercial centre, and there a commission of men of the highest standing was formed, by whom would be brought together the varied products of the various States of Germany. He afterwards proceeded to Switzerland, and he had reason to believe that there would be a good representation of the special products of that country, and they were not few. Thence he went on to the Kingdom of Italy—now more important than ever—and there he found the government most willing and anxious to do what they could towards this enterprise, though they could not undertake a money expenditure for the purpose. He (Mr. Macdonnell) stated that pecuniary assistance was not asked for; all they wanted was the official patronage and encouragement announcing to their subjects that the enterprise was deserving of support and co-operation. He was happy to state a large committee had been formed in Turin, comprising the first men in Italy; and the question now was, not whether they should get objects from Italy, but where they should put them. Milan would send some of her best sculpture, and Florence would not be behind in artistic productions. In Rome, too, after some preliminary difficulties, he received the assurance of Cardinal Antonelli, and from the Pontiff himself, that it should not be their fault if Rome was not as well represented in Dublin in 1865 as she was in London in 1862; and he had since his return received a despatch, stating that a commission of the leading men of the country had been appointed to take charge of this matter. Austria was the next country he visited, and there the difficulties on financial grounds were as great as in any other quarter, which, however, he could not quite so readily meet, because he could not undertake to send a steamer to Vienna; but in this respect the ready assistance of the Rothschilds was accorded in getting a reduced tariff on the railways for conveying articles to the seaboard, and he had every reason to expect an excellent collection from Austria. From Bavaria and Munich, the great centre of mural decorations, there was a probability of some of those cartoons being sent which had not appeared in any previous exhibition. He believed every country in Southern Europe would be represented in its art and manufacturing productions. With regard to the usefulness and importance of such a display there could be no doubt. Sir Robert Kane was quite right in saying there was no antagonistic rivalry between the progress or the genius of England and Ireland. On the contrary, he thought the one supplemented the other. The paper of this evening, as well as the discussion on it, would, he trusted, assist an enterprise whose only object was the advancement of their common country.

Mr. ANTONIO BRADY said he had been deputed to visit the north of Europe. He had taken the Scandinavian nations, and he had also good results to report. He had, however, met with the same objections on financial considerations as had already been referred to. The Swedish Minister had especially referred to the excessive expenditure incurred in the last Paris and London Exhibitions, which he was not prepared to recommend again. He was also met in many places with the idea that Ireland was a sort of Poland, in a state of anarchy and revolution, and there was no security for articles exhibited; and he was glad to find that Sir Robert Kane had given a very different and more truthful view of the general condition of the country. He desired to express his deep obligations to the officers of the South Kensington Museum, and especially to Mr. Owen, who had rendered the greatest service, not only by his advice, but by his letters of introduction to the leading foreigners who had been connected with the Exhibition of 1862. Having duly acknowledged the ready co-operation and courteous attention afforded by our ambassadors and consuls, Mr. Brady stated, that the encouragement he met with throughout the Scandinavian provinces was such as to enable him to assure those interested that most valuable contributions of artistic and manufacturing productions would be forthcoming from those northern nations. As regarded Denmark, unhappily he arrived just as that unhappy war, which had crippled the resources of that country, had closed. The enlightened government of that country, from the king downwards, had, after due consideration, promised hearty co-operation. The king, himself no mean artist, had promised to contribute to the Exhibition, and he (Mr. Brady) was confident in the belief that Denmark would be as well represented as any other country in Europe.

Mr. CHICHESTER FORTESCUE, M.P., having been called upon by the Chairman, said, as a member of the Colonial Department of the Government, he was glad to have the opportunity of saying, not only on his own but on the part of his right hon. friend at the head of that Department, it had given them great pleasure to have been the means of bringing this laudable enterprise before the notice of the colonies of Great Britain. He was not prepared to state in detail what the colonies respectively were prepared to do, but in general terms he might safely state that they were ready to respond to this invitation, and that the colonies of Great Britain would be properly represented in the capital of Ireland, as they had been in the capital of England. But, as an Irish member, he could not refrain from expressing his thanks to Sir Robert Kane for the extremely valuable and interesting address he had that evening delivered; and, more than that, he would express his thanks in the same capacity, if they would allow him to do so, to this assembly for having met here for the purpose of listening to and discussing such a subject as this. He thought it must strike many of them, as it struck him, while listening to Sir Robert Kane, how very great the contrast was between the former days to which he alluded and the present. He talked of days when Irish wool imported into England was considered a nuisance, but, among all the statements and evidence put before them by Sir Robert Kane, there was none to which he attached more value, or for which he was more grateful as an Irishman, than the hopeful spirit he had expressed in his address. He felt inclined to thank every Irishman —above all every distinguished Irishman—who, like the ancient Roman, did not despair of his country. He confessed they heard too much, both from the press of Ireland

and from public men, of that kind of despair which was too apt to fulfil its own predictions. He confessed a good deal of blame on that score attached to the class of men to which his noble friend and himself might be said to belong—viz., to politicians. He did not use it as a term of reproach, though across the Atlantic "politician" was about the worst name one could call a man; but, happily, that was not yet the case on this side of the water. No doubt the last three or four years had been years of great trial to Ireland; but it was consoling, when unhappy, to know the cause of the unhappiness, and if they were suffering from misfortune to know its source, and look forward to its termination. He believed there would not be a doubt that Sir Robert Kane had told the simple truth. He had heard from Irish farmers and men of business that the temporary check which had been experienced—for it was nothing more than that—had only been caused by the exceptional disadvantages of the three last summers. It was a misfortune to a country to have but one string to its bow; and one of the great objects of this Exhibition was to endeavour to provide Ireland with other strings to her bow. He trusted what they had heard to-night would induce many in this room and out of it, and those of other countries, to visit Ireland for themselves, to see what she had done, and what she could do; and he hoped foreigners would see that the miserable and contemptible libels poured on Ireland from some quarters were odious falsehoods. They would find that Ireland was not another Poland, but, on the contrary, a country—no doubt with many things, like other countries, requiring correction—but a country well governed, and capable, by exerting self-reliance, of taking a creditable position by the side of this country as an integral part of it. He trusted that would be the effect of this great enterprise. He trusted large numbers would visit the Exhibition and would make that passage between England and Ireland which Sir Robert Kane had described in such glowing terms.

Mr. HENRY COLE, C.B., would merely call attention to one point which had not been touched on, either in the paper or in the remarks that had followed it. He hoped the Managing Committee of the Exhibition would provide for that which was now attracting great attention in London, and which might be made an interesting feature of the Exhibition in Dublin, viz., an exhibition of the industry of the workmen of Ireland, as a separate section. Of course the works of artisans and others would be exhibited among the manufactures, but he thought an attractive section might be made if the workmen of Ireland were inclined to show the fruits of their ingenuity.

Dr. BACHHOFFNER was anxious to know whether it was the intention of the Commissioners of the Dublin Exhibition to apply to the Government to pass a short Act of Parliament, as was done in the case of the Exhibition of 1862, for the protection of unpatented inventions.

Mr. MACDONNELL stated that the Attorney-General for Ireland would prepare such a Bill to be introduced on the assembly of Parliament.

Mr. W. HAWES remarked that hitherto the discussion of this able paper had assumed almost entirely an Irish character. As he thought the facts stated and the views taken by Sir R. Kane were equally important to them as Englishmen—equally important to the whole country as to Ireland alone—he hoped he might for a few moments call attention to the facts, to show how they as Englishmen were interested in the success of this exhibition. They could not see the progress of manufactures, of industry, and education; they could not hear that wages had been increased, that vice had diminished, and that the consumption of spirits had enormously decreased, without feeling that a country which perhaps had not hitherto raised the national character of the empire, was now progressing in a way which was calculated to make Ireland a source of great power and strength, and a country of which England had reason to be proud. As Englishmen we could contribute to the success of this enterprise, which had been so energetically taken up by the Irish people themselves. That Exhibition must not be received as a mere temporary display. It would have a permanent and beneficial influence on the industry and commerce of Ireland. It would stimulate her to rely more on herself, to establish new manufactures, and make herself more independent; and force into activity and life those seeds of prosperity which had long been lying dormant. A competition would be produced which would urge on both countries to produce better articles than they had hitherto done, and thus would the closer connection with Ireland and her manufactures result in benefits to both countries.

Mr. HARTLEY expressed his opinion that much of the evil of the industrial system in Ireland would be remedied by a proper system of apprentice laws, by which the extension of skilled labour would be promoted, and a great want of the country supplied.

The CHAIRMAN said it was his pleasing duty to move that the thanks of this meeting be tendered to Sir Robert Kane for the admirable paper which he had been kind enough to read to them; and he only wished, that in doing so, he could adequately express what he was sure was the feeling of every one who had heard him. At all events, if he was not able to find words which would satisfy those whom he had the honour of representing, he could assure Sir Robert Kane there was not one in the room who more thoroughly appreciated the perspicuity, the moderation, and the truth of every single opinion and every single fact to which he had given utterance. He might be permitted to refer to one or two points in which he could especially confirm, from his own personal experience, the observations made by Sir Robert Kane. Sir R. Kane had stated it was to the development of Irish manufactures that they must principally look for the prosperity of that country. In that opinion he cordially coincided. As an Irish landowner, he had been painfully aware of the innumerable ills which had arisen as a consequence of the undue pressure upon the land of Ireland. In consequence of so very few openings, indeed, he might almost say, no other opening being afforded to the industry of the country, except that which was connected with the cultivation of the soil, the peasantry of the country had been reduced to a condition which was incompatible with their prosperity or their comfort. There was no Irish landowner who, if he was a conscientious man, could dare to accept for his land the competition prices which would be offered for it. Land was, in fact, almost a monopoly, and the consequence was, the margin of profit to the cultivator, which in other countries was amply sufficient for education, decent clothing, and comfortable housing, was in Ireland reduced to the smallest possible extent. He was happy to be able to confirm, from his own experience, what Sir Robert Kane had stated with regard to the enormous stimulus which had been of late given to the linen manufacture. He happened to live in the neighbourhood of Belfast, and he believed nearly every manufacturer in that town was making something like £1,000 per week at this moment. A personal friend of his own, who, having acquired an ample fortune, was about to retire from business, offered his mill for sale two years ago, at the price of £80,000, and was bid only £70,000 for it, consequently he retained it in his possession, and a few months ago he had the satisfaction of disposing of it for £180,000. Before he concluded, he thought he should be fulfilling the wishes of those present if he expressed their thanks to those two gentlemen who had acted as ambassadors to other countries on behalf of this Exhibition. He would now, on the part of the Society, return to Sir Robert Kane their most hearty and cordial thanks for the services he had rendered to them and to the cause of the proposed Exhibition, and of Irish manufactures. When, hereafter,

Ireland should have attained that position of eminence in that career of progress which he trusted was now opening before her, the name of Sir Robert Kane would be remembered in the catalogue of those men whose patriotism and devotion to their country had laid the foundations of her prosperity.

Sir ROBERT KANE expressed himself as much gratified by the kind manner in which his paper had been received, and also by the way in which the Chairman had been pleased to express the thanks of the Society on this occasion. He assured the noble lord and the Society there was nothing from which he expected more practical advantage to the cause of the prosperity of Ireland than the increase of mutual good feeling and co-operation between this country and his own.

BRITISH ASSOCIATION, BATH, 1864.

ON THE PRACTICAL PROGRESS OF NAVAL ARCHITECTURE IN OCEAN AND RIVER STEAMERS, TUGS, AND TOW VESSELS.

In the Mechanical Section, Capt. Andrew Henderson, C.N.E., A.I.C.E., read a paper on this subject, in which he entered upon the various types, from the Leviathan to the Nautilus, and systems of steering and towing, as shown in the summary of results of trials and performances in England and India, and illustrated the subject by diagrams, plans, and models, with tabular record of their relative dimensions, cargo, draft, displacement, and other elements of resistance, engine-power, and speed realised, and measured by dynamometer, the *plus*, *minus*, and *frictional* resistances of three types of vessels at three different speeds, giving their relative drafts and capability for cargo: with suggestions for improvements in the steerage of the *Great Eastern*, and large iron-clads of the Leviathan type, and small iron-clads, rams, and gun-boats, similar to the *Assam Nautilus*, by the use of balanced rudders in bow and stern. The reading of the paper was prefaced by a reference to the models of the four types of river steamers and barges, the resistance of which had been ascertained by dynamometer at trials in this country in the Nautilus, or native type, the Assam type, as established on the Burhampooter, and the Punt type, or Bourne's Patent Train of Articulated Barges, tried on the Thames, Tyne, and Clyde, in 1859-60. The model of the dynamometer showed the mode of application to the tow rope, and a printed return of test trials was furnished of those as well as of the large Indus troop steamer, tried on the Thames in 1861, representing the European type of river steamers on the plans of a Government commission.

The sheer and deck plans of the European type, the Punt type, tried on the Indus, and of the Assam type and Nautilus, or native type, were shown in a comparative plan of midsections of ocean steamers and clipper ships, published with the paper read before the British Association, at Liverpool, in 1854, with suggestions for the improvement in the steering of the *Great Eastern*, *Warrior*, and other iron-clads. The author said, in explaining a subject so complicated, it was difficult to give in a small compass the results of experience of many years. In the early establishment of steam communication in India he took a leading part, and subsequently devoted his time and attention to improvement in the form and construction of river steamers, and making experiments in steering and towing with a view to economic transit. His nautical experience originated in service in her Majesty's ship *Bellerophon*, and her boats, and in merchant shipping in voyages to India and the Pacific, the coasts, ports, and rivers in India, China, and the Eastern Archipelago, the latter in a very fast-sailing old American privateer, and subsequently superintending the building and fitting up of the Forbes steamer, of 300 tons, and 120 H. P., as a tug on the Hooghley, and opening steam communication between India and China by towing the *Jemesina*, of 380 tons, from Bengal to China against the Monsoon, in 1830. In 1831 he built the clipper *Water Witch*, 380 tons, in Calcutta (a model of which was shown) partly on a French model, designing himself the masts, sculls, rig, and fittings. After twelve successful voyages to China, she was dismasted, on the last, owing to the strain on the wing transom jamming the rudder. Based on this experience he designed the *Ariel*, with fuller after lines and round stern.

On his return to England in 1837, at the request of the late Lord William Bentinck, he gave evidence before Parliament as to steam communication in India, and after obtaining information from that eminent draughtsman, the late Mr. Waterman, he participated in the formation, in London, of the East Indian Steam Navigation Company and Assam Company, in 1839, the former proposing to the Indian Government to carry a monthly mail to the three presidencies of India in vessels of 2,000 tons, for a guarantee of £100,000 a year. The Assam Company was formed in 1839, by the union of Local and London Company to take over the Government tea gardens in Assam; and as a director of the Local Board, he designed and contracted for a steamer, barge, and portable saw mill, specially adapted for the service of the company, and as a Calcutta director, in 1841, tried and established the steamers on the Bengal river.

A model of the steamer, with bow and stern rudders, was shown on the table, the origin of the Assam type and balanced rudder system of steering. Between the *Water Witch* and *Assam* models are those of a first-class flotilla of the Assam type, tug and two auxiliary tow vessels, 35, 33, and 30 ft. broad, and 200 feet long, to carry 1,200 tons, 10 miles an hour, with 250 horse power. The *Sir James Melvill*, 33 feet broad, 130 horse power, was sailed out with false bottom, as shown by the model and plan, and is now towing two barges similar to the trial barge, 30 feet broad, and has been profitably employed on the Ganges and Burhampooter since 1863, by the River Steam Company of Calcutta.

Three steamers, 35 feet broad and 170 horse power, similar to the trial barge of the Assam type, and his models, are now on the Bengal rivers, which he considered as the practical progress towards improvement in his large class flotillas, as, exemplified by the drawing appended, shown on one-sixteenth inch scale, sheer and deck plan of tug and two tow barges, of the above breadth, illustrating the system of steering and towing with balanced bow and stern rudders and radial tow spar; and on ½ inch scale the details and improvements in fitting balanced bow and stern rudders, resulting from the numerous trials in the experimental *Assam Nautilus*.

Proceedings of Institutions.

MANCHESTER MECHANICS' INSTITUTION.—On Friday evening, Dec. 2, a meeting was held in the Mechanics' Institution, Mr. O. Heywood in the chair, for the distribution to the pupils in the Institution school and classes of the prizes and certificates won by them in the last examinations. The Chairman said the Institution had about 1,300 members, of whom about 300 were life and honorary members. The classes of the Institution were better and more regularly attended, and more real industrious work done and more steadily done now than for a long period. The number of teachers in the day and evening classes was twenty-five, and to them the Institution was largely indebted for its present distinguished position. The number of general members of the Institution was, however, less than it was five or six years ago. Notwithstanding that the classes were better filled, and that more honours were obtained, the Institution did not retain its old members. The Directors had made efforts to overcome that disadvantage by establishing a billiard-room and a gymnastic class; but the fact remained the same,—they kept no hold on those who had got beyond the practical teaching

of the classes. That should not be. He hoped that, as they had done before, so again the Directors would succeed in striking out new lines and courses, so as to make the Institution as attractive and amusing as in other respects it was instructive. In 1858, the first year that the certificates of the Society of Arts were awarded, 19 certificates, in all, were taken by the students of the Mechanics' Institution. In 1859, the Institution took three first-class certificates; in 1860, two; in 1861, five; in 1864, 19 first-class; while 64 certificates in all were taken, and £8 in prizes. In 1863, the number of first-class certificates was seven; and of second class, fifteen. This year the first-class, as already stated, numbered 19; and second-class, 23. The number of third-class certificates was the same in each year, namely, 22. The increase this year was, therefore, mainly in the first-class. With regard to the Government Science Examinations, the Institution had in three years increased its first-class honours 2½-fold; in second-class honours fourfold, and in third-class honours twofold. Since last year the increase had been wholly in the first and second classes. The Institution this year took three silver medals and four bronze medals.—Lord Stanley, M.P., congratulated the members upon the flourishing condition of the Institution, which had preserved itself and its character through the vicissitudes of forty years, while many kindred Institutions had either perished or been converted into club-rooms for the middle classes, or centres for party organization. The work of a Mechanics' Institution is to continue for such persons as desire it, and to extend the very limited and imperfect teaching which alone a school for the industrial class, or indeed for any class, can pretend to give. His Lordship continued:—A boy is taught in his school, well or badly, as the case may be, till he is twelve years old. If his parents are poor, he does not stop much longer; and for myself I value so highly the advantages for an early introduction to the practical duties of life, that I don't grudge that early departure. But if he leaves at that age, he can have got very little beyond the mere ground-work of knowledge, the power of reading, writing, and cyphering; and, for my part, I wish schoolmasters would recognise that fact more clearly than they do. I don't think they quite understand of how very little use it is stuffing children's memories with facts, or with what are supposed to be facts, to which no definite idea is attached. I have heard boys rattle over names of kings and countries when I was quite sure not one in fifty of them had any definite notion of what was meant by a king, or what the capital of a country was. I have always said, and always shall say, that if a child learns at school to read easily, and with pleasure to itself, to write well, and by that I mean distinctly, and to do common sums, the schoolmaster has done his share, and other agencies will complete what he has begun. People are beginning to find out what, if they would use their own observation more, and not follow one another like sheep, they would have found out long ago, that it is doing positive harm to a young child, mental and bodily harm, to keep it learning, or pretending to learn, the greater part of the day. Nature says to a child, "Run about;" the schoolmaster says, "Sit still;" and as the schoolmaster can punish on the spot, and nature can only punish long afterwards, he is obeyed, and health and brain suffer. I have nothing to say against hard work—brain work or hand work; I believe it to be healthy, and that at a riper age those whom it injures are infinitely few compared with those whom it benefits. But you must let nature have her way. Three or four hours of attention are quite enough in a day for any child, and if you accept that principle it follows necessarily that the school must leave much undone, and that some other machinery of teaching is required, such as that provided here. It is the idlest folly to try to turn out men and women as you turn out manufactured articles, all done by one pattern. It takes some of all sorts to make up society. How often, in the upper ranks of life, one hears it said "So-and-so is a fine lad; he'll make a capital soldier, a sailor, or a colonist, but he has no turn for books." Do not mistake me. I think that the studious type of character is, on the whole, both the happiest and the highest. Men of that turn have pleasures and resources which others have not, and which never wholly fail. That is no small matter, because sheer weariness, dulness, the monotony of a life which is safe but not eventful, lead to half the mischief which men do to themselves and their families by falling into bad ways. All I say is (because we gain nothing by exaggeration), that those who take that line, those who care really for reading, and for self-improvement, will never, in any class, be more than a fraction of the whole. But then they are a very important fraction, important in the influence which they exercise, if not in their numbers. What we have to do, is to see that men of that type, in the less wealthy class, have a fair chance of developing such faculties as they may possess. Our business is to find the tools; let those who can and will use them; and that there will be, that there are many such, I do not doubt. The people of Manchester know what they are about too well to go on year after year spending money on a thing which gives them no practical return. It is often said, "Look at the very ablest and cleverest of your self-raised men, men that have had little or no instruction; very often they know next to nothing outside their own particular business." That may be true enough. Mechanical genius, or a turn for commercial enterprise, like any other gift, is born in a man. That is to say, we do not know how or whence it comes; but we do know this, that those who have the most of it, those who owed their success entirely to themselves, are the very men who are keenest in the desire that those who come after them should have better opportunities than they had. Look at George Stephenson! No man probably better understood the ideas or the wants of the class from which he sprung; and no man more warmly interested himself in institutions of this kind, as the people of the northern districts well know. His son, Robert Stephenson, was a man of the same stamp; and in that, as in other matters, he followed in his father's footsteps, and I think I am not wrong in saying, unless my memory fails me, that by his will he largely and liberally endowed an institution of this kind in his native town. On that point I should like to call some other eminent witnesses to the truth of what I am saying. Such witnesses would not be wanting, for the name of your late respected president—the name of Fairbairn—will, I believe, be remembered along with that of the two Stephensons. But he is happily present, and I shall allow him to speak for himself. I think that support which such men give to the work we have in hand, is a far stronger argument in its favour than if it were left to the interested assistance of parties or sects, to the patronage of politicians canvassing for popularity, or even to the not illiberal ostentation of millionaires desiring credit for the use they make of their wealth. There is one point in connection with this undertaking which it is always well to notice, I mean your independence of all state aid and of all state control. I fear that in other besides educational matters there is some decrease in that wholesome jealousy, with which the middle classes of England have always been in the habit of looking on any attempt of the executive to extend its functions. I say nothing against the help given to primary instruction, or, in plain English, to boys' and girls' schools. I believe that is necessary. The last generation had, and the present generation still has, to make up long arrears created by centuries of neglect. In such a case, private means would be utterly inadequate; and seeing a great work before it which must be done, and seeing only one means of doing it, the community had practically no option. But I hold that where the necessity ends, there the interference should end also. Freedom, security, industry, will always create large fortunes. Public opinion demands of the owners of wealth that they shall use it

liberally for the general good; and many a man (most men), if I may trust my own experience, would rather give £50 freely, with that reward which they naturally expect from the gratitude of their fellow-citizens, than have £5 screwed out of them by taxes. I don't object to these Government prizes, insignificant as they are in pecuniary value, though I believe if they were done away you would have as much or more contributed by private agency. But I should be sorry to see a system of grants and subsidies applied to adult education, however plausibly such a system might be defended. Even as regards optional inspection, which some people propose (though I don't say there is much harm in it), what can it do for you more than is done already by these various examinations—those of the Society of Arts, and those set on foot by the universities, both new undertakings, and neither costing a shilling to the public? State help has done nothing for English manufactures; English farmers are not trained in Government schools; nor have our great engineers come out of Government workshops. Yet our manufactures travel to every corner of the earth, our engineers are employed in every country, and our farming, imperfect though it may be, is probably the highest in Europe. The work on which you are engaged is only a part, it may be but a small part, of a great national movement. The school, the institute, the cheap newspaper, the cheap book, go together with the benefit society, the savings bank, the freehold cottage, the co-operative mill, and, better still, the co-operative store. —Mr. W. Fairbairn moved a vote of thanks to Lord Stanley, which was seconded by Mr. J. A. Turner, M.P., and carried unanimously, and the meeting separated after passing a vote of thanks to the Chairman.

Fine Arts.

DELACROIX AND FLANDRIN.—The exhibition of the collected works of Eugène Delacroix is about to close shortly. It is now proposed to gather together as many as possible of the paintings and sketches of the late Hippolyte Flandrin, and to exhibit them in the rooms of the *Ecole des Beaux-Arts*. Should this intention be carried out, and there is no reason to suppose that it will not, there is no doubt that a highly interesting collection will be the result, though the best, or some of the best productions of Flandrin's pencil must still be sought in the churches and other public buildings of Paris and other towns; nevertheless, the sketches for those large and elaborate works are, in an artistic point of view, deeply interesting. In the case of the Delacroix sale, this class of works formed by far the most attractive of the whole collection, and the same must be the case, or nearly so, in the instance of Flandrin. The Municipal Council of Paris has, on the proposition of the Prefect, followed the example of the Emperor, and voted the sum of a thousand francs in aid of the funds for the monument of Flandrin, to be placed in the old church of Saint-Germain-des-Prés, which contains so much of his painting. A commemorative tablet, in bronze, has just been placed on the façade of the house in the Place Furstemberg, in Paris, in which Eugène Delacroix died; another is to be affixed to the house at Charenton-Saint Maurice, where he was born.

PUBLIC STATUES.—An equestrian statue of Napoleon I. is about to be raised in the Place d'Armes at Grenoble, to commemorate his passage through that town on his return from Elba. The Emperor is to be represented in the costume which he wore at that period. On the two long sides of the pedestal are to be placed bas-reliefs in bronze; one representing the Emperor at Laffrey, at the moment when, accompanied by a weak escort, and opposed by a troop sent to bar his passage, he is said to have bared his breast and to have cried—"Soldiers, I am your Emperor! Do you not know me? If anyone desires the life of his general let him take it!" The other bas-relief represents the Emperor outside Grenoble, at the moment when preparations were being made to force the old gate of Rome. The statue is to be in bronze, and placed on a bold pedestal of the fine stone of the Ardèche. Between twenty-five and thirty designs have been sent in for the monument to be erected to the memory of the late Minister Billault, in the town of Nantes; they are to be exhibited this week in the museum there.

PICTURE BY GRENZE.—A dealer in curiosities purchased a picture the other day of a country curé, near Cambrai, for fifteen pence, and sold it almost immediately afterwards for two pounds; after passing through one or more pairs of hands it was purchased eagerly by a rich amateur of Rheims for the sum of 3,100 frs. (£124).

EXHIBITION OF FINE ARTS AT BORDEAUX.—The exposition of the *Société des Amis des Arts* is announced to open in March next. Works intended for exhibition, including paintings, sculpture, architecture, engravings, drawings, and lithography, are to be sent in between the 1st and 10th of February. The society pays all expenses in case of artists invited to contribute, but the size of cases is confined to six feet in height and width; and the weight of sculpture to 400lbs. The present year is the thirteenth of the society's existence, and the exhibition was opened on the 20th of March and closed on the 22nd May. It contained 473 works of art, of which 113 were sold for the aggregate sum of 51,869 frs. The sales of the twelve former years amounted to 539,972 frs. (£21,599). Of these, fifteen works were acquired for the Bordeaux Museum, at a cost of £3,000. This year the Emperor became patron of the society, and contributed a thousand francs to its funds. The Conseil-Général of the Department voted 1,500 frs. and the Municipal Council of Bordeaux 1,000 frs., besides supplying the gallery for the exhibition without charge. The society counts 600 members, who subscribe each a pound a year.

SALES OF OBJECTS OF VERTU IN PARIS.—The collection of the late M. Fossé d'Arcosse was disposed of the other day, and some of the objects realised very large prices. Amongst the most curious was an hour-glass which belonged to Henry II. The frame was supported by five columns in gold and mother-o'-pearl, at each end was a medallion in mother-o'-pearl, one representing the bust of the king, with the letters HR. FR., and the other the arms of France. The hour-glass was enclosed in a case of stamped leather, decorated with gold fleurs-de-lis, and was accompanied by two letters in proof of its authenticity. The whole fetched 2,000 frs. A small lantern, in paper and mother-o'-pearl, ornamented with silver, formerly the property of Marie Antoinette, sold for 89frs. A hammer, which belonged to Louis XVI., an elegant tool, ornamented with incised work, including dolphins and the letter L interlaced, fetched 130 frs. A small gun made for another unfortunate dauphin, Louis XVII., sold for 180 frs. A mother-o'-pearl medallion, bearing a bust of Louis XV., signed Durand, and presented to the king after the battle of Fontenoy, 120 frs. A snuff grater, formerly belonging to the regent, in ivory, ornamented with a subject from the story of Mars and Venus, and bearing the arms of the House of Orleans, 118 frs. A hunting knife, the blade pierced and engraved, and the handle in ivory, decorated with the arms of France and Burgundy, 232 frs. A miniature of the Princess Pauline Borghèse, by Isabey, 163 frs.

CHARLES V. INKSTAND.—A very curious object is now on sale at a shop in Madrid, an inkstand, composed of Egyptian amber, ivory, gold, and carnelion, formerly belonging to Charles V. It is in the form of a Greek temple, of the composite order, decorated in all parts with carving and painting of high finish. In the interior are the arms of the Emperor, surrounded by portraits of all the members of his family. On the sides are figures of an immense number of the grandees of Spain of that period, cardinals, bishops, captains, generals, and beautiful

women. The lid is ornamented with a portait of Cardinal Ximénés, by the side of which are statues of Diana and Flora. The interior is divided into two compartments; in one is a statuette of the Emperor, and in the other that of the Empress; and at the foot of these are smaller figures, representing Piety and Hope. A figure of Neptune, in rose coloured carnelion, is detached, and its proper position cannot be determined. In the opinion of good judges this curious object represents twenty years' labour.

Manufactures.

SUBMARINE AND OTHER FOUNDATIONS. — An invention of Captain Thomas Bridges Heathorn, R.A., of 14, St. James's-square, London, has for its object improvements in the construction of submarine and other foundations in deep water, under the circumstances of a level, shelving, or sloping bottom of a varying density, possibly covered with mud, sand, or shingle to a great depth. The method of constructing the foundations for such structures upon a level bottom is as follows:—The caisson, which is of annular construction, with a triangular section, is made of sheet iron; the bottom portion is floated out to sea, exactly over the spot upon which the building is to be erected, and there anchored; concrete is then placed in the caisson, so as to cause it to sink equally, and, as soon as it is sufficiently deep in the water, an additional height of the caisson is fixed, and more concrete placed therein to sink it deeper. This operation continues until a firm foundation is obtained by the weight of the caisson with its interior filling of concrete causing it to sink through the mud or other soft ground to the hard ground beneath; the interior is then filled up with stone or concrete, upon which, and the concrete in the caisson, the superstructure is erected. For shelving or sloping bottoms the caisson will bear only upon the highest side of same, and to preserve the perpendicular of the said caisson, immediately it touches the hard ground, stones are placed in the interior of the caisson, which will naturally settle themselves in such position as to form a wall underneath that portion of the caisson which does not touch the hard ground, thereby forming a foundation upon which the caisson may rest. The mode of obtaining foundations in deep water will also apply to obtaining same in soft or peaty ground on land, and in some cases the interior filling of stones will be omitted, and the caisson allowed to sink until it is prevented from further movement by the internal apertures closing, as the building up of the inner side terminates in a conical apex.

MUSEUM AND LIBRARY OF INDUSTRIAL ART, PARIS.—A new museum and library has just been commenced by the *Union Centrale des Beaux-Arts appliqués à l'Industrie*, which have already been referred to in a cursory manner in the columns of the *Journal*, and which are installed in a suite of rooms in one of the houses of the fine old square called the Place Royale. The collection is not yet very large, but promises well. The museum contains some admirable specimens of art manufactures, ancient and modern, including porcelain, faïence, terra-cotta, enamels, wood carvings; fine old tapestry work from Holland, with designs evidently borrowed from the East; some specimens of old book-binding, and a number of illuminations of great beauty. There are also many interesting objects of a miscellaneous character; amongst these are two or three examples of a kind of ornamental work that is rather rare, namely, chased bronze; bouquets of flowers and other ornaments being carved in high relief, apparently in the solid metal, or possibly cast and afterwards chased. These curious plates are of the time of Louis XIV. The library contains a large number of fine illustrated works of various kinds, and it was pleasant to read the names of Pupin, Owen Jones, and other English writers on artistic subjects, on several title-pages and backs. The most characteristic feature, however, of this department is a large collection of patterns that have been actually used in the manufacture of ornamental tissues and paper hangings; these occupy a very long range of large portfolios, and are peculiarly adapted for the class of students for whose benefit this establishment is specially designed. There are also some curious collections of old patterns and specimens of actual fabrics, and some paper hangings of the earliest period of that manufacture in France, copied apparently from chintzes which, as regards taste in design, neatness in execution, and brilliancy of colour, would lose nothing by comparison with a very large proportion even of the most beautiful works of that class produced by the able French manufacturers of the present day. A portion of the contents of the museum, and, probably, of the library also, are lent for exhibition by their owners, but the remainder have been purchased out of the funds of the society. It is a remarkable fact, especially in France, that this laudable institution is the result of purely individual exertion, the whole of the members of the committee of organisation, with one single exception, that of a banker, being artists or manufacturers—architecture, designing, mechanism, bronze work, ornamentation; carpet stuff, lace, paper hanging, furniture making, and goldsmiths' work being all represented. These far-seeing industrial artists, warned by the rapid progress made in other countries since the commencement of the era of international exhibitions, formed themselves into a society, with the title given above, in 1861, for the organisation of Exhibitions of Industrial Art, the first of which was held in that year in the Palais de l'Industrie, and the second in 1863, and announces a third, on a much larger scale, for 1865. The Museum and Library are very important results of the Society's action. At present, and till the end of the present month, the new Museum is open to the public, but it is intended for a place of study, not as a popular exhibition, and, being unaided by Government grant or the public purse, the committee will be compelled to charge a fee to the students; this is at present fixed at three francs (half-a-crown) a month. In addition to the use of the Museum and Library, the subscribers will have the benefit of courses of lectures and elucidations, to be given in the evening, by artists and others capable of guiding the students to a due appreciation of the contents of the museum and library, the proceeds to be employed in the augmentation of both. As regards the majority of the articles of modern manufacture, they will be renewed at intervals of three months, so that the young designer and workman will have an opportunity of studying and comparing the products of the present day as they appear. In speaking of the new Institution the other day, a Parisian journalist said:—"The Museum of South Kensington, the honour of England, had a more modest commencement than this." This is scarcely the fact, but the observation shows how the efforts made in our country in the direction of Industrial Art are appreciated abroad. This Society, although self-formed and self-supporting, has the countenance of the authorities; the museum has been visited by the Minister and Superintendent of Fine Arts, and the former has presented it with an admirable collection of sea weeds, arranged by an artist-designer, who presented it to the Emperor, in which the natural specimens are accompanied by samples of tissues, the designs for which have been derived from the types here brought into direct comparison with them. The courtiers of the Court of Catherine de Medicis, who once inhabited this fine quaint old square, little thought that a Working Man's Museum and Library would one day occupy the best floor of one of their courtly mansions.

LARGE TELESCOPES.—A fine reflecting telescope has just been sent from Paris to the Marseilles observatory; this instrument measures eighty centimètres, or 31·520 inches aperture; its focal length is five metres, or 5·47 yards; and it is moved by isochronate machinery. It is the work of M. Léon Faucault. The Toulouse observatory is having one constructed on still larger proportions.

Colonies.

AUSTRALIAN DIAMONDS.—Diamonds have from time to time been found in the Ovens district, Victoria. Two were recently found by a man named M'Gill, in Finn's claim, on the Woolshed. One of these is said to be worth about £8 in its present state. These make seven diamonds found in the same claim. There has never yet been any systematic search in the district for precious stones.

THE SALMON EXPERIMENT.—We have to record an important event in the progress of the great salmon experiment. The parr artificially reared in Melbourne have been successfully deposited in a suitable stream. Mr. Ramsbottom, who brought the ova from England, reported to the Acclimatisation Society that the Yarra was admirably adapted for a salmon river—the more especially as better tributaries than the Watts and the Badger could not be wished for. The Council of the Society, remembering that the coming warm weather would greatly increase the difficulties of removing the fish, and being of opinion that it was of the greatest importance that the breeding depot should be within an easy distance of Melbourne, resolved not to detain Mr. Ramsbottom in exploring the Gipps Land and the other rivers which had been suggested as adapted for the purpose, but to authorise him to remove the parr to the Yarra with all possible speed. The particular spot which was selected is a point of the Badger Creek, about forty-five miles from Melbourne. Here a tank has been constructed, twenty-one feet long, six feet wide, and from two-and-a-half to four feet deep, the variation being intended to suit the fancies of the young fish for shallow or deep water. Through this tank a stream from the creek is made to run, and in it the parr will remain until, having developed into smolts, they are ready for sea, a date at least twelve months distant. The task of removing the parr was a very delicate one. The little fish were skilfully got together, and introduced to a travelling tank, which was swung from an improved universal joint in a light American waggon, while, so that the parr should not feel the change from a running stream, Mr. Ramsbottom sat by the tank throughout the journey aërating the water by dipping out cupfulls and pouring them back again. Leaving Melbourne at half-past three o'clock in the morning, the juvenile strangers reached their destination at half-past three the same afternoon; and, thanks to Mr. Ramsbottom's assiduity and to the skilful driving of the coach, only nine deaths occurred during the rough and long way. It is to be regretted that upon the parr being removed their number was found to be far less than it was supposed we were possessed of. Still, there is every reason to hope that there are enough in the Badger to secure the return of some of the grilse from the sea, and thus to render certain the success of the experiment. Thus far the work has gone on favourably. The past gives us confidence that in the end success will be attained. From Tasmania we hear good accounts of the parr deposited in the breeding ponds at Derwent; they are progressing favourably, but there will be no change to report until the advent of that mysterious instinct which prompts them seawards.—*Melbourne Argus.*

GRANITE.—A gigantic block of granite, thirty-six tons in weight, has been brought down to Melbourne from Harcourt (Victoria), in order to be worked into a monument, intended for erection over the remains of the explorers, Burke and Wills, in the Melbourne General Cemetery.

POST OFFICE SERVICE (VICTORIA).—The Victorian Government have proposed to establish a fortnightly service, in connection with the Peninsular and Oriental Company, at a cost of £50,000, one moiety of which they requested might be contributed by the colony. The New South Wales Government have, however, declined to co-operate with the Victorian Government in the establishment of the fortnightly service referred to. It still charges double postage for all letters sent to the United Kingdom by the mail steamers, notwithstanding the increased postage has been suspended in England. This step has caused much dissatisfaction, and has induced many persons who have a large correspondence to forward their letters to Melbourne for transmission. The other colonies continue to charge the old rate.

COAL IN NEW ZEALAND.—The Provincial Government is exerting itself to promote the working of the West Coast coal fields; and two tons of coal from the Buller, and about twenty-five tons from the Grey, are now in Nelson, being got ready for shipment to London for the purpose of being tried and reported upon by the Board of Admiralty. Meantime, boring on the side of Mount Rochfort, near the mouth of the Buller River, is being carried on with a view of ascertaining whether, by a drive or a shaft, the coal can be got on that side of the mountain instead of at the back, where it crops out in thick seams. If the results be favourable a great saving in the cost of constructing a road from the coal to the mouth of the river will be effected. The coal from the Grey is highly bituminous and burns strongly; that from the Buller is a harder coal, and is supposed to be the best for the furnace. Boring for coal is also going on at Pakawau. We stated some time ago that at a depth of fifty feet an excellent seam four feet in thickness had been discovered, but the boring has been continued, and has now reached a depth of 98 feet. The parties interested are sanguine, from the indications of the strata, that they are approaching other seams of equal, perhaps greater, thickness than the one spoken of.

Obituary.

CHARLES HARRIOTT SMITH, an old member of the Society, died on the 21st of last October. He was born on the 1st of February, 1792. His father, a respectable stone mason, in the Portland-road, considering reading, writing, and arithmetic, as sufficient scholastic acquirements for his business, took his son from school at the early age of twelve years, to initiate him in the operations and technicalities of stone masonry; but he soon acquired a taste for the conversation of well-informed persons, some of whom, especially Mr. Bonomi, the father, and his friend, young Donaldson, encouraged his aspirations for higher pursuits. After working hours, he employed himself in drawing and modelling. This paved the way to his admission, as a student, to the Royal Academy, where, besides modelling and drawing, he applied his mind to the study of Grecian and Gothic Architecture. He became a member of the Society of Arts in 1814, when he was only sixteen years of age. If at the Royal Academy he acquired skill in the practice of his art, here he learned to reason and collect information. With what satisfaction, in after life, he would dwell on the discussions of Alexander Galloway, Bryant, Donkin, Brunell, and other able men, from which he derived much mechanical knowledge; from Britton, Brayley, and Strutt, he acquired a taste for archæological research; and in chemistry, mineralogy, and geology, he found valuable instructors among its members. Soon after his admission, the Duke of Northumberland, presiding, put a subject to the vote; seeing a youth of sixteen hold up his hand, his Grace asked if boys were allowed to vote; the answer was in the affirmative, and young Smith, proud of the privilege, was the more anxious to exercise it discreetly and honourably. He soon secured the good-will and growing esteem of many of the members, as Charles Warren, Horsman Solly, Britton, Varley, Brockedon, and of their excellent Secretary, Mr. Arthur Aikin. When the late Sir Charles, then Mr. Barry, was preparing to carry out his designs for the Parliament Houses, he felt a difficulty in obtaining an adequate supply of good stone, and proposed to Govern-

ment a survey of all the principal quarries in England and Scotland; fortunately, he became acquainted with Smith, through the late Joseph Hume, one of the Vice-Presidents of the Society of Arts; and the Royal Commission for this inquiry was composed of Mr. Barry, Sir Henry Delabeche, the well-known geologist Dr. William Smith, and the subject of this notice. Their examination of our ancient buildings, castles, and churches, and of the quarries whence the material had been drawn, was careful and judicious, and the report proved a valuable addition to our artist's professional knowledge. Mr. Smith's zeal and intelligence had won for him the esteem of his fellow-commissioners, and their friendship continued through life. Sir Charles Barry, having decided on the quarry that from experience, and from tests carefully made by Professors Daniel and Wheatstone, was best suited for his purpose; but aware that in every layer there are imperfect veins, proposed to Government to appoint Mr. Smith inspector of the stone as supplied by the contractors, in order that his practical knowledge should prevent any unsound admixture; unfortunately, false economy prevailed, the precaution was not adopted, and many inferior blocks were admitted, to the serious regret of all parties. Mr. Smith's sound knowledge was generally recognised; he was elected an honorary member of the Royal Institute of British Architects, to whose transactions he contributed many interesting papers. In later times he visited the quarries of Caen, in Normandy, in company with Mr. George Godwin, F.R.S., the interesting results of which soon after appeared in the *Builder*. He had become a sound authority on the subject, and all who had, or thought they had, a bed of valuable stone in their estate applied to him for his opinion, which he gave most liberally and honestly, too much so, perhaps, to agree with many ill-founded expectations, however candid and kind. As a writer and a lecturer he was clear and distinct; occasionally, but not often, a touch of humour or of ornament glittered for a moment. Some of his best writing is, perhaps, an essay on "Linear and Aerial Perspective," in Arnold's "Library of the Fine Arts;" an excellent treatise on an important subject of which he was thorough master, and which gave him a skilful and judicious execution of ornaments at the London University, the Royal Exchange, and other buildings. At the Royal Academy he gained the gold medal for the original architectural design in 1817, and continued for successive years to exhibit designs in architecture and models, and portrait busts and monumental compositions; but science, chemistry, geology, antiquities, and general knowledge, led him chiefly to scientific institutions, where his conversation was always acceptable. The year before his death, though suffering, he visited the Isle of Mull and Iona, and returned an enthusiastic admirer of the Scottish Royal monuments; but increasing infirmities prevented him from writing an account of them, for which his peculiar talents and knowledge so admirably fitted him.

Frederic Struve.—The celebrated Russian astronomer, whose name is associated with all the great works of triangulation and geodesy carried out in Russia and Eastern Europe, died on the 23rd of November, at St. Petersburg. He was born at Altona, in April, 1793, and studied philology, and afterwards astronomy, in the University of Dorpat, in the government of Livonia. In 1813 he was attached to the observatory of that town, becoming its director four years afterwards. In 1832 he removed to Pulkowa, and was appointed director of the magnificent observatory which the Russian Government had established there, which post he retained till his death. M. Struve undertook and carried out various important works and scientific expeditions, by a description of which scientific libraries are much enriched. His son, M. Otto Struve, studied under his accomplished father, and obtained the post of Second Astronomer of the Pulkowa Observatory.

Professor Benjamin Silliman, sen., expired at his residence, New Haven, U.S., on the 24th Nov. Mr. Silliman was the son of Gen. Gold Selleck Silliman, who rendered his country important service during the revolutionary war. He graduated at Yale in 1798, afterwards studied law, and was admitted to the bar in 1802. He afterwards accepted the chair of chemistry in Yale College, and visited Europe to prosecute his studies in a science which was at that time almost unknown in America. He returned after an absence of fourteen months, and published an interesting account of his travels. In 1807 he made a chemical analysis of a meteorite of great size and brilliancy which had burst in the town of Western, Connecticut. He afterwards assisted Dr. Ware in his experiments with the oxyhydrogen blowpipe, to which he gave the name of "compound blowpipe," by which it is commonly known. In 1818 Professor Silliman founded the *American Journal of Science and Arts*, better known both in Europe and America as *Silliman's Journal*, of which he remained senior editor till 1846. He was one of the earliest Americans to give popular lectures on scientific subjects. In 1830 he visited Europe a second time. He resigned his professorship in 1853, but continued to give lectures for two years longer. He was a man of simple tastes and active habits, and his old age was remarkably free from mental or bodily infirmity, and to the very last he took a deep interest in the progress of science, humanity, and freedom all over the world.

Publications Issued.

L'Architecture Privee au XIXme. Siecle sous Napoleon III., &c. Par M. César Daly. Folio. Paris: Morel and Cie.—The author of this work is well-known as one of the most daring and elegant writers on architecture in France, and yet, with the experience of what he has done before, the present publication is a marvel, and does high honour to the reign in which it is produced. It consists of three folios of engravings, in all about two hundred plates, executed on steel, in the most careful and artistic manner, representing select specimens of the architecture of the present day in France, divided under the three main heads of private houses or hôtels, houses constructed for being let out in separate tenements, as is usual in Paris, and villas or suburban residences. Each example is accompanied by plans and details, covering, in some instances, ten or twelve sheets, and each of the nine groups or sub-divisions is accompanied by what is called a parallel of plans, or, in other words, a collection of plans of other houses of the same class brought into comparison with each other. The elevations are drawn to a scale of one in a hundred, and the plans half that proportion, while the smaller details are given on one in four. It is impossible to exaggerate the beauty of the work in an artistic point of view. Every line is as clear as print, yet each elevation is a picture, but without anything extraneous being introduced. The cleverness of French architectural draftsmen is well know, and no work that we are acquainted with affords better examples of it than that under notice. It is a monument of drawing and engraving as well as of architecture. The letter-press which prefaces the work contains a good deal of matter of interest to others besides architects. M. Daly makes judicious remarks on the essential differences between public and private architecture, on the requirements of families with respect to accommodation and health, and on the peculiar demands arising out of French habits and manners, which he contrasts with those of England, a task for which he is peculiarly fitted, as having passed a considerable portion of his life in this country. Secondly, he treats the important question of the proper characteristics of art as applied to private dwellings, and where they differ from those which should mark the public edifices of a city. Thirdly, he sets forth a series of canons of construction, both as regards single and compound edifices;

and, lastly, he gives an elaborate estimate of the cost of the new houses in Paris and its environs, in all their details. The resumé of this portion gives us the following information:—Private mansions in Paris, of the first and second class, cost, on an average, from 500 to 650 francs per mètre superficial, and those of the third class 400 to 450 francs; mixed residences in Paris, from 500 to 1,100 francs; and suburban residences from 400 to 600 francs. M. Daly boldly dedicates his work to Baron Haussmann, the prefect of the Seine, whom Paris wits call the Arch Destroyer, but whom M. Cesar Daly, and, probably, architects in general, regard as a special providence.

L'ETRURIE ET LES ETRUSQUES. Par Noel des Vergers. 2 vols. and Atlas. Paris: Firmin Didot.—This is the work of a learned and a travelled man, an original and important production. The first volume is devoted to the geology of Etruria, the origin of the Etruscans, their confederation in the plains of the Po, their commercial relations with the nations of Greece and Italy, their political constitution, their religious systems, and the development of the arts amongst them; the second volume traces the history of the nation from the foundation of Rome to the end of the Empire. The "Atlas" contains chromo-lithographic representations, beautifully executed, of the best known types of Etruscan vases, and each plate is accompanied by a commentary, in which the difficulties that surround the interpretation of the mythological figures and emblems of the period are discussed and explained. In addition to this the author has given a collection of epigraphic monuments, a comparative table of the Etruscan, Phenician, and Greek archaic alphabets; and an archæological chart of Central Etruria.

WORKS OF THE ETCHING SOCIETY OF PARIS.—The Société des Aquafortistes, now three years old, exhibits great activity and much talent, although some times a little eccentric, wanting rather in a nice appreciation of the line of demarcation between the comic and caricature, Amongst its recent productions is a graphical edition of the famous old legend of Marlborough, "Malbrook," full of riotous fun and sparkling with invention, an admirable example of the grotesque; the artist being M. A. de Boret. Another series of a very different kind, by M. C. Longueville, consisting of twelve plates of landscapes and marine pieces, exhibits a fine eye for effect and most careful execution. The young artists of Paris have taken up etching as a weapon against wood engravers and photographers, and they are perfectly right in so doing; the conflict cannot but be good for art, and none of the combatants are likely to suffer.

REPORT ON VARIOUS HOSPITALS OF GENEVA, TURIN, AND MILAN. By Anthony Roulliet. This is a document addressed to the French Minister of the Interior, and is an instalment of the information which is being collected by a commission appointed by imperial decree, to inquire into the alimentary and sanitary systems of hospitals. The inquiry is intended to embrace all the hospitals of Paris and London, and also those of several other towns in France and other countries. The returns obtained from the French hospitals, with the aid of the authorities, are said to contain much important information; as regards London, it is said that nothing has yet been done. The author of the report in question is an advocate, attached to the commission, and was charged to collect information in Italy and Switzerland. The report is general in its scope, and includes, amongst other things, plans of the buildings, apparatus for ventilation, systems of washing, cleansing, baths, medical and pharmaceutical services, and tables of mortality.

FABRICATION DES ETOFFES. TRAITE COMPLET DE LA FILATURE DU COTON. Par M. Alcan. Paris. This is an important work, in two parts, on the spinning and weaving of cotton and other textile fibres. The first part contains an investigation into the peculiarities of the fibres themselves, illustrated by microscopic sections; the cotton of Egypt, India, the Levant, and Algeria, and the proposed substitutes for that fibre, being especially considered. It includes also a history of the progress of the industry from the earliest known period. The second part is more specially technical, and includes a curious synoptical table of the transformations of fibrous substances, such as cotton, flax, hemp, wool, and silk. India rubber, the metals, glass, and bark, which are employed, or might be employed, as auxiliaries in textile manufacture; elaborate descriptions of machinery used; and a chapter on the establishment of mills, their construction, lighting, heating, ventilation, steam power, and cost. The work is illustrated by fifty plates and cuts.

WORKS OF ALPHONSE X., OF CASTILE.—The third volume of the works of this old astronomer has just been presented to the Paris Academy by M. Le Verrier, who calls attention to the curious fact that the path of the planet Mercury is there described as oval. Alphonse wrote in the eleventh century, and of course knew nothing of the laws of Kepler, but he had arrived at the conclusion that nothing but a kind of ellipse would represent the movement of Mercury.

Notes.

EDUCATION OF GARDENERS.—The Royal Horticultural Society has just issued its programme for the ensuing year; and members of the Society of Arts will see with satisfaction the announcement made respecting the education of gardeners, as follows:—"Examinations and Certificates for Gardeners.—Central Examinations of Gardeners in Theoretical and Practical Gardening will be held annually at South Kensington, and Local Examinations will be held in the country. Certificates of competency and prizes will be awarded at both Examinations."

A CHIMNEY, about 100 feet high, comprising about 90,000 bricks, and estimated to weigh over 200 tons, was recently moved a distance of 100 feet in Worcester, Massachusetts, without breaking a brick.

RAILWAY IN BRAZIL.—A new railway has recently been opened in Brazil, which crosses the mountain chain, Serra-do-Mar, and connects the interior fertile plains with the sea-coast. It is eighty-eight miles long, and attains, in the course of five miles of mountain-steep, an elevation of 2,600 feet. The entire ascent is divided into four lifts, or inclines, of a mile and a quarter each, running at a gradient of one in ten. A level platform, or "bank-head," marks the summit of each incline, and at the upper end of the platform is a stationary engine. This engine has double cylinders of twenty-six inches diameter, with a five-feet stroke, and has been calculated to haul up fifty tons at the rate of ten miles per hour. Five boilers, of the Cornish description, are placed with each engine. On the upper half of each incline there is a double line of rails, with arrangements for passing-places on the middle of each of these lifts. A single line of rails then run on from the centre to the foot of each of the four divisions into which the ascent is divided. A steel wire rope, $1\frac{1}{8}$ in. diameter, is made for pulling up the ascending trains. This rope, tested to a weight far exceeding the requirements that will be made upon it, passes over friction-wheels, and is attached to the fly-wheel shaft. The inclines are partially self-acting, at the same time passing one train down to the foot of the Serra and drawing up another to the higher levels on its way out to the province beyond.

A LOCOMOTIVE from Spain has passed through the Pyrenées into France, along the new series of tunnels, about forty miles in length. This was merely a trial trip, and it was perfectly successful.

RAILWAY BRAKE.—AN experiment was lately tried to ascertain how quick a railway train under full headway might be stopped. It was allowed to attain a speed of fifty miles an hour, when the brakes were applied and the steam shut off. It came to a dead stand after running about 500 yards, being 60 yards more than a quarter of a mile.

SUBSTITUTES FOR CRANES AND HODMEN IN PARIS.—The *Builder* states, that "some of the contractors rebuilding the demolished houses, and running up quickly new mansions, have hit upon an ingenious way of raising materials to the top of the scaffold. As the head of water at the Villette is enough to command any of the houses in Paris, they have simply a pipe turned on from the main up to the top of the intended structure, and by that means can fill a bucket or large tub, which in descending draws up a plateau on which the materials are placed. The water, being turned into mortar, and otherwise made use of afterwards below, is not lost. Some of the materials are also hoisted by Lenoir's machine (by gas); there is one at work at the Rond Pont de Corcelles, close to the Avenue de Ternes. It seems to be, by timing a weight ascending a certain height, about 2½-horse power. The absence of a boiler in these engines is a strong argument in favour of employing them where steady slight power is required. At all events, if they are not endowed with the abundant force of a steam-engine, yet in towns and confined streets, where only a moderate source of power is required to act in a small compass, noiselessly and without nuisance, we have seen that the required mechanical effect can be accomplished without risk of explosion, and consequent damage and loss of life, either to owners or their neighbours. That is something, at all events."

TECHNICAL EDUCATION IN FRANCE.—The *Société Philotechnique*, for the gratuitous instruction of workmen, is of some years' standing, and has branches in all parts of the capital. The other day there was a meeting of the Suresnes section, when M. Glachant, the Chief Secretary of the Minister of Public Instruction, presided, and made a remarkable speech. This gentleman has evidently studied the subject—technical education—both at home and abroad; he told the assembly that reading, writing, and arithmetic, were not learning, but merely means for acquiring education, and that the present state of society demanded for the workman a knowledge of the principles of his art, without which he ran great danger of becoming a mere slave of mechanism, the machine which he should direct. The remarks concerning what had been done abroad showed how carefully France watches what is going on elsewhere. In Belgium, said M. Glachant, with a population of four millions, there are no less than 1,145 adult schools, of which 27 meet in the day-time, 173 in the evening, and 945 on Sunday, the total number of scholars being 180,000. At Ghent there are more than 40,000 weavers, and not a single industrial school—the evening schools supply all that is wanted. In Russia education is obligatory until the age of sixteen; after that the youths attend the schools of Art and Industry (Gewerbschulen). The Sunday schools of Barmen and Eberfeld were established by a generous Frenchman, but the authorities of the latter place aided with a vote of 600,000 francs (£24,000). But the example of England occupied the greater part of M. Glachant's attention, not only on account of the amount of effort made, but also for the originality of the form as regards the Literary, Scientific, and Mechanics' Institutions, which are certainly unique in Europe. The influence of these is illustrated by the fact of "700,000 francs being raised for some special object by voluntary subscription in one day at the Manchester Mechanics' Institution, and by the act of the Society of Arts in obtaining the guarantee for the Exhition of 1862. M. Glachant applauds the system of the introduction of music and other means of recreation into our popular institutions, and says:—"As our neighbours have borrowed the word Soirée from us, let us borrow from them the thing to which they have applied it." But it is the Kensington Museum which calls forth M. Glachant's warmest encomiums. He calls it the "Babylonian museum of South Kensington." He gives the statistics of the schools there and in connection with it; he speaks of the acts of the Committee of Council of Education as "the most gigantic effort ever made in aid of industrial art and the generalization of practical instruction." "On the morrow of the Exhibition of 1862," he says, "a cry of alarm arose amongst our workmen (the French) that England had moved!" His concluding remarks are for all the world:—Pupils of the Philotechnic Association, it is not necessary to show you that your rivals are doing their best to cause you to exert yourselves. You will soon learn, if you have not already, all the secrets of your professions. On this head you might teach your professors. Still you will listen to those men who have never handled a tool, for you know that they can aid you in becoming more expert; for increased intelligence gives the hand more hardihood and dexterity. An ignorant workman dare not depart from an old bad system; but he who has learnt to reflect searches and finds improvements and new applications, which often produce revolutions in industry."

FINAL DEMOLITION OF THE EXHIBITION BUILDING.—On the 12th instant, at half-past eleven, the whole of the central entrance in the Cromwell-road was brought to the ground, being the last appearance of any part of the Exhibition building. The public will recollect what an enormous mass of brick-work this was. Some of the piers were twelve feet in thickness. Having been prepared beforehand, by the sappers, under command of Lieut. Knocker, a hundred-and-twenty-pounds of gunpowder in as many separate charges, distributed at the footings of the whole mass, were fired simultaneously by two electric batteries. The charges had been so arranged, and the calculations so made, as to cause the whole mass to fall inwards towards the north; and the mass was obedient to the laws of science, so that not a brick tumbled in the Cromwell-road. The greater part of the northern side gradually subsided to the ground, leaving momentarily a large portion, which was projected inwards, by the fall of the Cromwell-road front upon it. As soon as the smoke and dust had cleared away the western tower was seen to be standing. Gradually the sappers approached to find out why it had not fallen like the rest. They had scarcely reached it before it began to vibrate, and in a second afterwards fell like the other portions. Each part of the towers and great arches of the Exhibition building have thus afforded a series of the most valuable experiments, and it is said that the data obtained considerably modified those which formerly were accepted. The experiments have lasted about three months, and the delay, which some persons did not understand and complained of, is now fully explained by the successful work of last Monday. The members of the Society of Arts will be glad to be informed that a paper on the subject, by Lieut. Knocker, will be read in the course of the session.

CONSUMPTION OF SUGAR IN ENGLAND AND FRANCE.—Official documents show that the consumption of sugar in 1863 in England and France was as follows:—England, 480,000 tons; France, 260,000. The average consumption for the four years—1846 to 1850—was respectively 280,000 and 112,000 tons, and for the four years—1850 to 1854—357,000 and 119,000 tons. The consumption has consequently doubled within 18 years—a fact of some importance, the consumption of sugar being held a conclusive test of material prosperity.

CANADIAN journals are agitating the subject of a grand Provincial Exhibition, in which the two Canadas shall unite in offering 20,000 dols. in premiums, and challenging New York State to enter the lists in competition therefore. It proposes, as an inducement for exhibitors from long distances, that premiums be offered for leading products

of the manufacturing and agricultural interests only, so that they would tempt a large competition. It is asserted that leading agriculturists of Lower Canada are anxious to bring about such a joint exhibition.

MEETINGS FOR THE ENSUING WEEK.

MON. ...Society of Arts, 8. Cantor Lectures. Mr. B. Waterhouse Hawkins, "On the Reproduction of Natural Forms by Art and Manufacture." Lecture II.
British Architects, 8.
Medical, 8. Mr. Hunt, "On the Present State of Medical Logic."
R. Asiatic, 3.
TUES. ...Civil Engineers, 8. Annual General Meeting.
Statistical, 8. Mr. James Heywood, "On the Extension of Modern Subjects as a part of Regular Study in Educational Institutions."
Pathological, 8.
Anthropological, 8.
WED. ...Society of Arts, 8. The Articles sent in Competition for the Art-Workmanship Prizes will be Exhibited, and a Report in connection therewith will be read.
Geological, 8. 1. Mr. W. Keene, "On the Coal-measures of New South Wales with Spirifers, *Glossopteris*, and *Lepidodendron*." Communicated by the Assistant-Secretary. 2. Mr. Searles V. Wood, jun., "On the Drift of the East of England, and its Divisions."
London Institution, 7.
THURS...Royal, 8½.
Antiquaries, 8.
Philosophical Club, 6.

Patents.

From Commissioners of Patents Journal, December 9th.

GRANTS OF PROVISIONAL PROTECTION.

Butts of bent iron plates, machining the ends of—2900—T. W Penton and H. Penton.
Carbonizing wood, apparatus for—2884—M. Henry.
Cash samples, bags for containing—2910—G. Kottgen.
Cigar holders, butt-pieces for—2928—A. Oberdoerffer.
Coal, &c., machinery for getting—2929—P. Haggie and A. Gledhill.
Coal, distillation of—2484—J. G. Beckton.
Colours, apparatus for stamping—2911—H. L. Maquet.
Colouring matter, manufacture of—2916—J. C. L. Durand.
Engine, rotary—2751—W. Thrift
Fire arms, breech loading—2951—C. Reeves.
Fire arms, breech loading—2983—W. J. Matthews.
Gold leaf, &c., manufacture of—2872—J. H. Johnson.
Guns, working of—2882—T. A. Blakely.
Hats, manufacture of—2887—W. Wilson.
Hats—2971—A. I. L. Gordon.
Hauling apparatus—2961—G. Newsum.
Heating rooms, boilers for—2828—T. Jones.
Heating apartments, fire-places for—2901—W. E. Newton.
Heatings rooms or buildings, apparatus for—2949—J. Grundy.
Horse hoes, &c., construction of—2881—W. Sargent.
Iron tubes, manufacture of—2877—J. Fisher.
Iron and steel, apparatus for manufacture of—2904—J. Griffiths.
Jacquard cylinders, improvements in—2866—J. Hughes.
Knitted or looped fabrics, machinery for—2886—J. Webster and J Langham.
Lace, manufacture of—2302—S. Bates.
Lamp—1902—A. Kistemann.
Liquors, apparatus for drawing off—2880—J. Behrends.
Mathematical instruments—2895—J. Pitman.
Motive power—2779—G. A. Galloway.
Motive power—2989—A. Hawkes.
Moulding and planing wood, machinery for—2875—H. Wilson.
Mules for spinning—2922—J. Paley.
Navigable vessels, motive power for—2890—E. S. Jones.
Paper pulp, apparatus for manufacture of—2896—J. Easton, jun.
Paper hangings, gold, apparatus for manufacture of—2909—J. Wylie.
Paraffin, &c., lamps—2871—T. Rowatt.
Paraffin oil, apparatus for drawing off—2981—R. F. Dale.
Photographic processes—2953—L. Crozat.
Piled fabrics, method of weaving—2908—H. Eckersley.
Pipes and tobacco, cases for carrying—2898—W. Palmer, jun.
Power engine—2918—T. M. Brisbane.
Presses for baling—2578—W. Clark.
Preserving ships' bottoms—2985—H. Caunter.
Pressing and baling goods, machinery for—2979—A. V. Newton.
Projectiles, manufacture of—2853—J. P. Nolan.
Pulp, preparation of—2913—W. Ibotson.
Railway trains, communication between passengers, guard, and drivers of—2935—R. Wheble.
Railway trains, communication for travellers with the guard—2868—R. W. Sievier.
Revolvers—2513—I. Williams.
Roads, sweeping, machines for—2975—G. Davis.
Rock and stone, machinery for excavating—2914—P. E. Gay.
Sails, reefing and furling—2915—T. Shorley and G. Gibson.
Sewing machines—2902—W. Martin.
Sewing machines, winders for—2903—H. Willis.
Ships' anchors—2878—S. Sharp.
Signals—2710—R. C. Robinson.
Signals, &c., apparatus to exhibit—2926—J. S. Gisborne.
Sleepers for railways, machinery for sawing—2874—H. Wilson.
Smoothing and polishing, apparatus for—2930—G. Brunton.
Spirituous liquors, distilling and purifying—2973—C. J. Falkman.
Steam boilers, prevention of accidents with—2891—J. Phillips.
Steam boilers or generators—2893—A. H. Stott.
Steam hammers, &c.—2917—R. Morrison.
Steam in steam engines, regulating the flow of—2888—J. Petrie.
Steel castings, manufacture of—T. E. Vickers.
Studs, buttons, &c.—2956—L. A. Waldemar.
Sugar, manufacture of—2906—A. V. Newton.
Sugar, turbine for drying—2965—L. Montaigue.
Torpedo rams—2799—G. A. Henty.
Travelling railways—2931—E. Molyneux, jun.
Vapour, cold, apparatus for creating—2889—S. Piesse.
Vent pegs and valves—2905—S. Bourne.
Washing, &c., apparatus for—2919—N. Hodgson.
Weaving, looms for—2897—J. Gaukroger.
Weaving, looms for—2955—C. Hartley.
Weaving, looms for—2991—R. L. Hattersley.
Window sashes, apparatus for lifting—2924—S. Price.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

Gas, illuminating, manufacture of—3042—G. T. Bousfield.
Infant tender and exercising apparatus—3019—G. Haseltine.

PATENTS SEALED.

1445. W. H. James.
1456. W. Sharp.
1459. W. E. Gedge.
1460. W. Martin.
1461. R. A. Brooman.
1465. E. Pope.
1468. J. Brown, T. Way, and T. M. Evans.
1469. G. A. Burn.
1477. W. Dawes.
1487. G. Gondelfinger & J. L. Bichet.
1499. G. Newton & J. Braddock
1507. W. Clark.
1517. E. M. Boxer.
1524. J. C. Brentnall & R. Edge
1526. John Jobson.
1533. W. A. Abegg
1535. J. Thompson
1604. John Askew.
1630. R. Balans.
1946. G. F. Druce.
2006. W. Brenton.
2472. G. Haseltine.

From Commissioners of Patents Journal, December 13th.

PATENTS SEALED.

1472. W. Tregay.
1473. P. B. O'Neill.
1478. C. Taylor and J. Dow.
1482. R. A. Brooman.
1485. J. Fletcher and H. Bower.
1488. J. Lancelott.
1489. W. E. Gedge.
1493. R. W. Thomson.
1494. M. A. Muir & J. McIlwham.
1498. G. H. Ozouf.
1503. W. C. Jay.
1505. G. B. Morris, W. B. Price, and J. L. George.
1512. J. J. Bennett.
1513. W. H. Tooth.
1514. W. H. Tooth.
1515. T. Agnew, jun.
1518. W. Whiteley and G. Harling.
1528. G. Beard.
1529. J. H. Beattie.
1538. W. J. Pughsley
1558. C. H. Pugh.
1592. W. Brown.
1609. W. F. Thomas.
1646. A. V. Newton.
2221. E. O. Potter.
2305. W. Wilkinson.
2590. W. Snell.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

3060. J. D. Napier.
3072. W. N. Hutchinson.
3130. T. Walker.
3083. R. A. Brooman.
3110. J. Leeming.
3078. C. F. Varley.
3094. V. L. Daguzan.
3208. W. M. Williams.
2099. D. Vogl.
3106. R. A. Brooman.
3108. W. H. Tooth and W. Yates.
3119. J. W. Scott.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

1702. W. A. Gilbee.

Registered Designs.

Military Shoulder Sash—Dec. 2—4676—Thompson and Son, 11, Conduit-street, W.
Furniture of a Box or Cash Chest—Dec. 3—4677—James Ferry and Son, 2, Old Fish-street-hill.
The Fittings of a Box, Case, or Chest—Dec. 5—James Ferry and Son, 2, Old Fish-street.
The Shape or Configuration of a Sewing Machine Needle, to be called "The Crispin Needle"—Dec. 6—4679—Hollington and Son, Astwood Bank, Worcestershire.
Faucet for Drawing Liquids—Dec. 12—4680—Charles Bone Clark, Birmingham.